PIONEER
*The Art of Entertainment*

# Service Manual

ORDER NO.
**CRT1550**

MULTI-CD CONTROL FM/MW/LW TUNER DECK AMPLIFIER

# CDX-M65ZRV UC,X1H/UC

●**This additional service manual is designed to be used together with Model CDX-M6 Service Manual CRT1522. Refer to it for finding parts numbers and adjustment ,etc. which are not shown in this manual.**

●**This model has installed in RENGE ROVER and DISCOVERY.**
**(Number:AMR3053)**

## CHASSIS EXPLODED VIEW

●**Parts List(Page 51)**

| Mark No. | Description | CDX-M6/UC Part No. | CDX-M65ZRV/UC Part No. | CDX-M65ZRV/X1H/UC Part No. |
|---|---|---|---|---|
| 5 | Upper Case | CNB1653 | CNB1746 | CNB1746 |
| 13 | Main Unit | ⦿ CWX1512 | CWX1682 | CWX1717 |
| 14 | Extension Unit | CWX1566 | ⦿ CWX1716 | CWX1566 |
| 15 | Grille Assy | CXA6006 | CXA6121 | CXA6121 |
| 16 | CD Mechanism Unit | ⦿ CXK2750 | ⦿ CXK2750 | CXK2755 |
| 26 | Door | CAT1493 | CAT1591 | CAT1591 |
| 29 | Grille | CNS2550 | CNS2903 | CNS2903 |
| 35 | DIN Cord | CDE4125 | ····· | ····· |
| 36 | Cord | CDE3741 | ····· | ····· |
| 37 | Angle | CNB1765 | ····· | ····· |
| 40 | Screw | CBA1069 | ····· | ····· |
| 41 | Screw | HMB60P500FZK | ····· | ····· |
| 43 | Nut | NR60FZK | ····· | ····· |

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# PACKING METHOD

●Parts List(Page 63)　　✱:Non Spare Part

| Mark | No. | Description | CDX-M6 Part No. | CDX-M65ZRV/UC,X1H/UC Part No. |
|---|---|---|---|---|
| | 1-1 | Owner's Manual | CRD1645 | ····· |
| ✱ | 1-2 | Card | ARY1048 | ····· |
| | 6 | Accessory Assy | CEA1810 | ····· |
| | 6-1 | DIN Cord | CDE4125 | ····· |
| | 6-2 | Cord | CDE3741 | ····· |
| | 6-3 | Screw Assy | CEA1788 | CEA1913 |
| | 6-3-1 | Screw(x4) | CBA1069 | ····· |
| | 6-3-3 | Screw(x4) | HMB60P500FZK | ····· |
| | 6-3-5 | Nut(x4) | NR60FZK | ····· |
| | 6-4 | Angle(x2) | CNB1765 | ····· |
| ✱ | 6-5 | Polyethylene Bag | E36-622 | ····· |
| | 7 | Carton | CHG2304 | CHG2365 |
| | 8 | Contain Box | CHL2304 | CHL2365 |
| ✱ | | Caution Card | CRP1112 | CRP1126 |
| ✱ | | Caution Card | CRP1125 | ····· |

# ELECTRICAL PARTS LIST

●Parts List(Page 64)

| Circuit Symbol & No. | CDX-M6 Part No. | CDX-M65ZRV/UC Part No. | CDX-M65ZRV/X1H/UC Part No. |
|---|---|---|---|
| IC751 | PD5230C | PD5253A | PD5253A |
| R891 | RD1/4PS0R0JL | ····· | RD1/4PS0R0JL |

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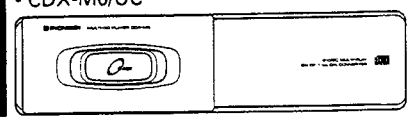
# Service Manual

• CDX-M6/UC



ORDER NO.
**CRT1522**

MULTI-COMPACT DISC PLAYER

# CDX-M6

**UC, EW**

COMPACT disc DIGITAL AUDIO

**●See the separate manual CX-613 (CRT1518) for the CD mechanism description.**

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## SPECIFICATIONS

**General**

System ..... Compact disc audio system
Usable discs ..... Compact Disc
Signal format ..... Sampling frequency: 44.1 kHz
Number of quantization bits: 16; linear
Power source ..... 14.4 V DC (10.8 — 15.6 V allowable)
Max. current consumption ..... 1.0 A
Weight ..... 2.4 kg (5.3 lbs.)
Dimensions ..... 275 (W) × 69 (H) × 155 (D) mm
[10-7/8 (W) × 2-3/4 (H) × 6-1/8 (D) in.]

**Audio**

Frequency characteristics ..... 5 — 20,000 Hz (±1 dB)
Signal-to-noise ratio . 97 dB (1 kHz) (IHF-A Network)(UC)
97 dB (1 kHz) (IEC-A Network)(EW)
Dynamic range ..... 94 dB (1 kHz)
Output level ..... 500 mV (1 kHz, 0 dB)
Number of channels ..... 2 (stereo)

**Note:**
Specifications and the design are subject to possible modification without prior notice due to improvements.

**●CD Player Service Precautions**

1. Since these screws protects the mechanism during transport, be sure to affix it when it is transported for repair, etc.
2. For pick-up unit handling, please refer to "Disassembly". During replacement, handling precautions shall be taken to prevent an electrostatic discharge (protection by a short pin).
3. During disassembly, be sure to turn the power off since an internal IC might be destroyed when a connector is plugged or unplugged.


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# 1. SAFETY INFORMATION

## 1.1 CDX-M6/EW

**1. Safety Precautions for those who Service this Unit.**

- **Follow the adjustment steps (see pages 7 through 25)in the service manual when servicing this unit. When checking or adjusting the emitting power of the laser diode exercise caution in order to get safe, reliable results.**

**Caution:**

**1. During repair or tests, minimum distance of 13cm from the focus lens must be kept.**
**2. During repair or tests, do not view laser beam for 10 seconds or longer.**

**2. A "CLASS 1 LASER PRODUCT" label is affixed to the rear of the player.**

Fig.1

**3. The triangular label is attached to the mechanism unit frame.**

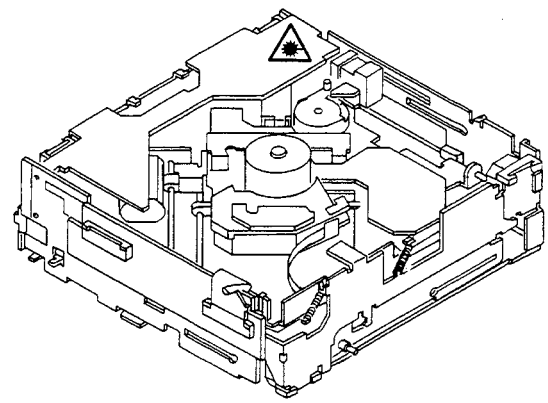


Fig.2

**4. Specifications of Laser Diode**

Specifications of laser radiation fields to which human access is possible during service.
Wavelength = 785 nanometers
Radiant power = 69.7 microwatts(Through a circular aperture stop having a diameter of 80 millimeters)
0.55 microwatts(Through a circular aperture stop having a diameter of 7 millimeters)

## 1.2 CDX-M6/UC

**CAUTION**

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer.
Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty.
If you are not qualified to perform the repair of this product properly and safely; you should not risk trying to do so and refer the repair to a qualified service technician.

**WARNING**

Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health & Safety Code, Section 25249.5).
When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale any smoke or fumes produced.

# 2. DISASSEMBLY

●Case

1.Unfasten six screws A and then remove the upper case.
2.Unfasten four screws B and then remove the lower case.

●Grille Assy

1.Unlock four catches and dismount the grille assy.

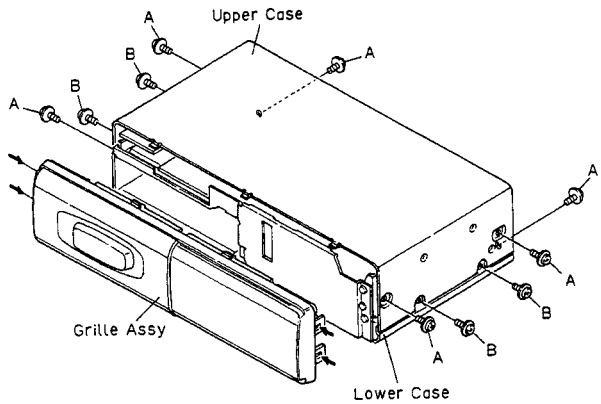



Fig.3

●Bracket L,R

1.Unfasten eight screws.
2.Remove bracket L.
3.Remove bracket R.

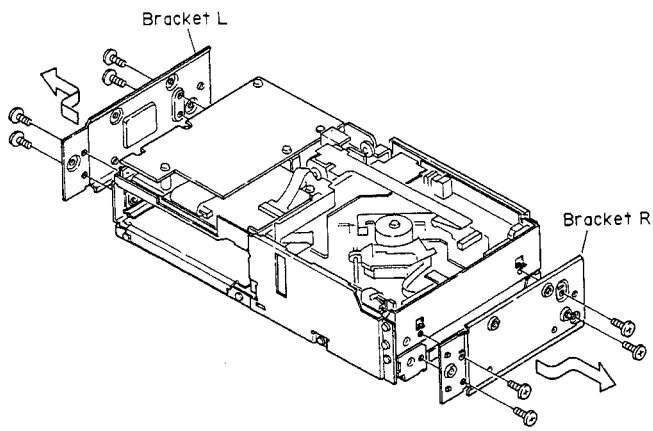



Fig.4

●Extension P.C.Board

1.Unfasten five screws.
2.Remove the connector.
3.Remove the extension P.C.Board.
NOTE:
Be sure to screw in order of 1-5.

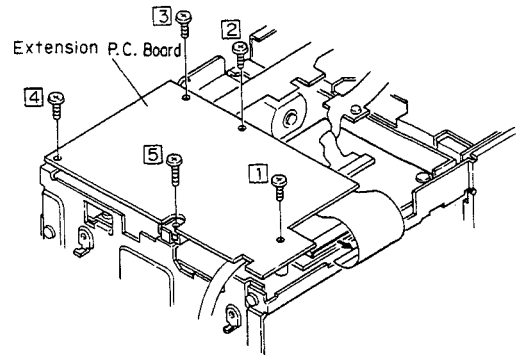



Fig.5

●CN351

Before disconnecting the CN351 connector (PU unit connector), attach a short pin as illustrated.

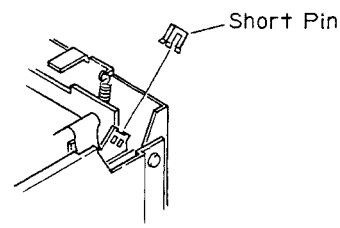



Fig.6

●Main Unit
1.Unfasten four screws.
2.Remove the three connectors.
3.Remove the main unit.
NOTE:
Be sure to screw in order of 1-4.

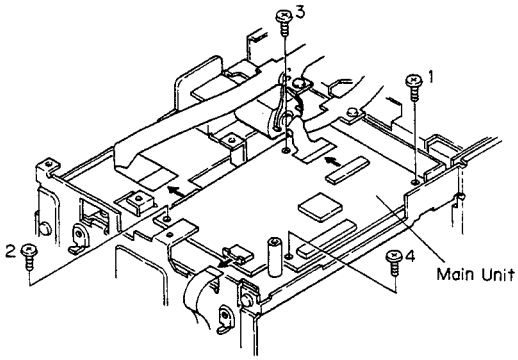



Fig.7

## 3. BLOCK DIAGRAM

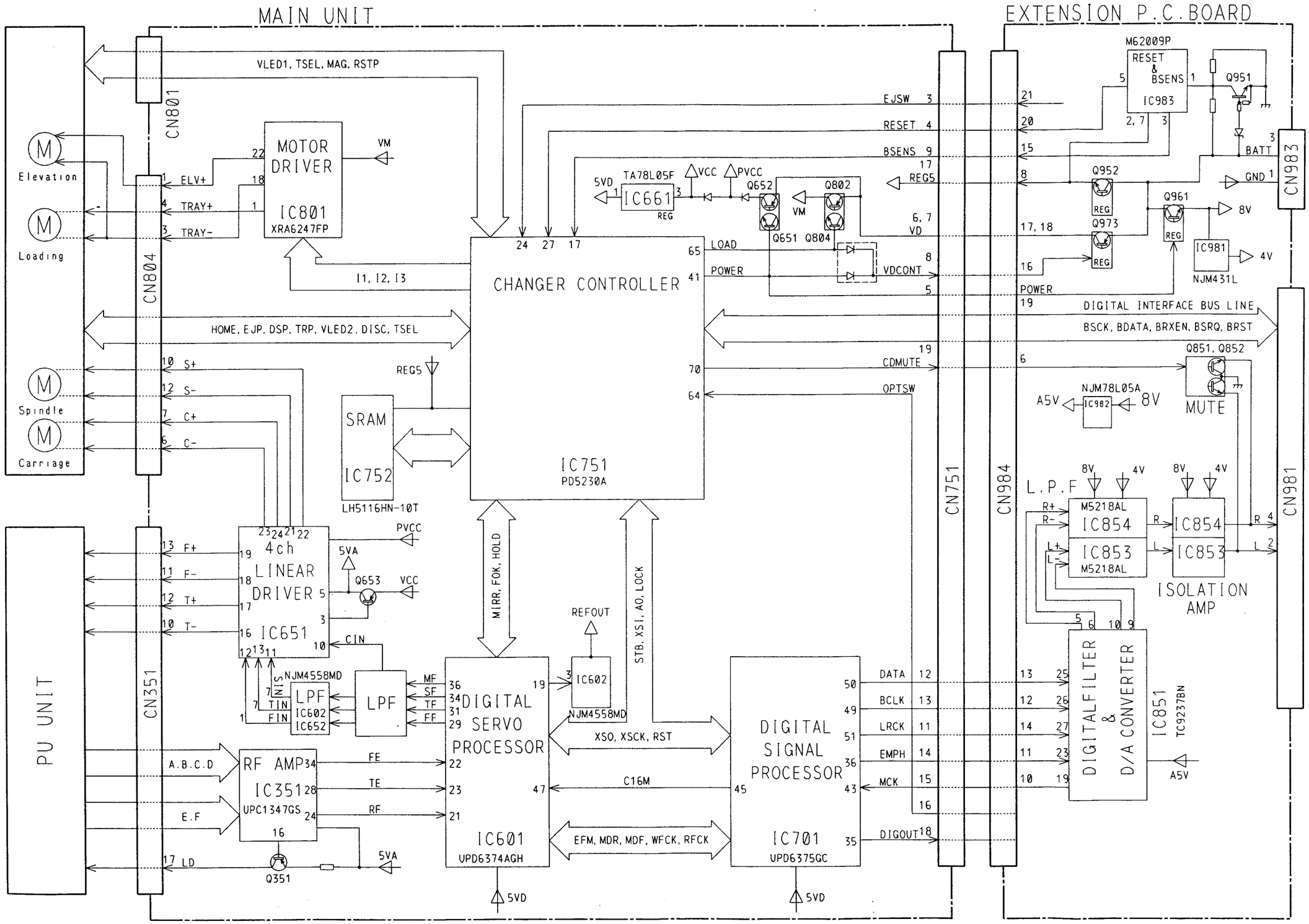



Fig. 8

# 4. ADJUSTMENT

1) Precautions

- This unit uses a single power supply (+5V) for the regulator. The signal reference potential, therefore, is connected to REFOUT (approx. 2.5V) instead of GND.
  If REFOUT and GND are connected to each other by mistake during adjustments, not only will it be impossible to measure the potential correctly, but the servo will malfunction and a severe shock will be applied to the pick-up. To avoid this, take special note of the following.
  Do not connect the negative probe of the measuring equipment to REFOUT and GND together. It is especially important not to connect the channel 1 negative probe of the oscilloscope to REFOUT with the channel 2 negative probe connected to GND.
  And since the frame of the measuring instrument is usually at the same potential as the negative probe,change the frame of the measuring instrument to floating status.
  If by accident REFOUT comes in contact with GND, immediately switch the regulator or power OFF.
- Always make sure the regulator is OFF when connecting and disconnecting the various filters and wiring required for measurements.
- Before proceeding to further adjustments and measurements after switching regulator ON, let the player run for about one minute to allow the circuits to stabilize.
- Since the protective systems in the unit's software are rendered inoperative in test mode, be very careful to avoid mechanical and / or electrical shocks to the system when making adjustment.
- When loading and unloading discs during adjustment procedures, always wait for the disc to be properly clamped or ejected before pressing the another key. Otherwise, there is risk of the actuator being destroyed.
- Turn power off when pressing the button ⏭ or the button ⏮ key for focus search in the test mode. (Or else lens may stick and the actuator may be damaged.)

2)Test mode

The model CDX-M6 is adjusted in a combination with the multiple CD control head (FH-M75, FH-M70, DEH-M980RDS, etc.). Each regulator key should be operated at the head. With the FH-M75,M70 taken up for reference, a description will be given below concerning how to enter into the test mode, including key operations. The key in the adjustment text is also one of the FH-M75, M70 keys.

- How to enter into the test mode
  While pressing keys 4 and 6 at a time, press the back-up ON or clear button ON the FH-M75, M70.
- Resetting the test mode
  Press the clear button ON the FH-M75, M70. Subsequently press the clear button ON the CDX-M6. Or turn off the CDX-M6 and the FH-M75, M70 back-up and wait for about one minute.
- Role to be played by each key in the test mode

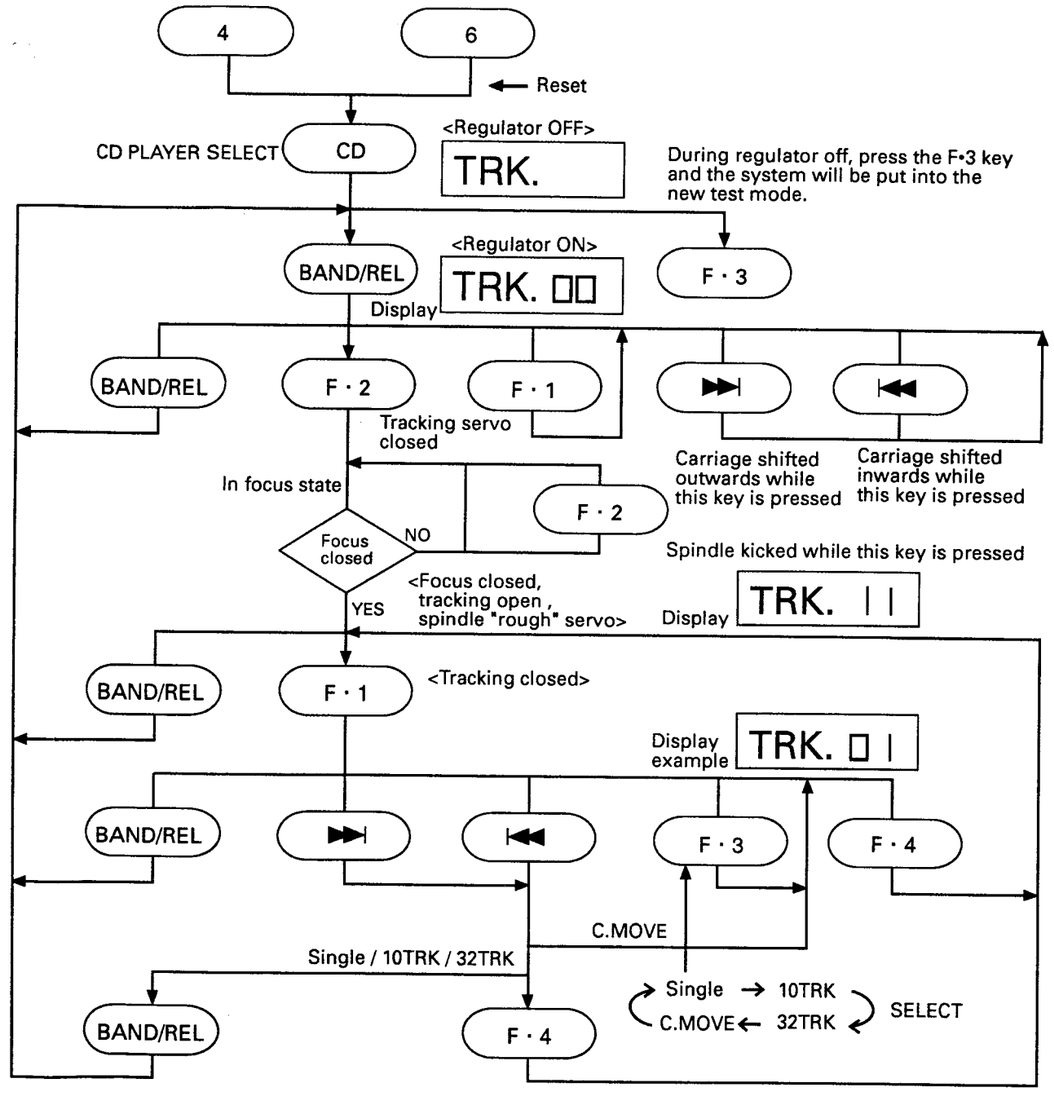
A function key permits you to select the CD multi-player or single CD player.

| Key | Function |
|---|---|
| BAND/REL | RegulatorON/OFF |
| ⏭ | FWD Kick |
| ⏮ | REV Kick |
| EJECT | EJECT |
| F•3 | Jump mode |
| F•1 | Tracking close |
| F•4 | Tracking open |
| F•2 | Focus close |
| CD | CD ON/OFF |

- SINGLE/10TRK/32TRK will continue to operate even after the key is released. Tracking closed the moment C-MOVE is released.
- JUMP MODE resets to SINGLE as soon as power is off.



**●Flow Chart**



● **Measuring Equipment and Jigs**

| Adjustment | • Measuring equipment&jigs |
|---|---|
| 1. Grating Adjustment-1 (Rough adjustment) | • Oscilloscope, clock driver, grating adjustment filter (bandpass filter)(GGF-133), AC milli-voltmeter<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| 2. Tangential Skew Check | • Oscilloscope, screwdriver<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 : DIN Cord:GGF1159 |
| 3. Grating Adjustment-1 (Fine adjustment) | • Oscilloscope, clock driver, two low-pass filters<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| 4. Grating Adjustment-2 | • Oscilloscope, grating adjustment driver, low-pass filter<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| 5. FE Bias Adjustment | • Oscilloscope, volume adjustment driver<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| 6. RF Offset Adjustment | • Oscilloscope, volume adjustment driver<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| 7. TE Offset Adjustment-1 | • DC voltmeter or oscilloscope, volume adjustment driver<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| 8. Tracking Balance Adjustment-1 | • Oscilloscope, volume adjustment driver<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| 9. Focus Servo Loop Gain Adjustment-1 | • Oscillator, gain adjustment filter (GGF-065), oscilloscope, dual meter milli-voltmeter, volume adjustment driver<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| 10. Focus Servo Loop Gain Adjustment-2 | • Oscillator, gain adjustment filter, oscilloscope, volume adjustment driver<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| 11. Tracking Servo Loop Gain Adjustment-1 | • Oscillator, gain adjustment filter (GGF-065), oscilloscope, dual meter milli-voltmeter, volume adjustment driver<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| 12. Tracking Servo Loop Gain Adjustment-2 | • Oscillator, gain adjustment filter, oscilloscope, volume adjustment driver<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| 13. TE Offset Adjustment-2 | • DC voltmeter or oscilloscope, volume adjustment driver<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |

| Adjustment | • Measuring equipment&jigs |
|---|---|
| **14. Checking FEY Level** | • Oscilloscope<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |
| **15. Tracking Balance Adjustment-2 And Checking TEY Level** | • Oscilloscope, volume adjustment driver<br>• SONY TYPE 4 (or ABEX TCD-782)<br>• Extension Cable:GGD1023 • DIN Cord:GGF1159 |

## ●Adjustment Points

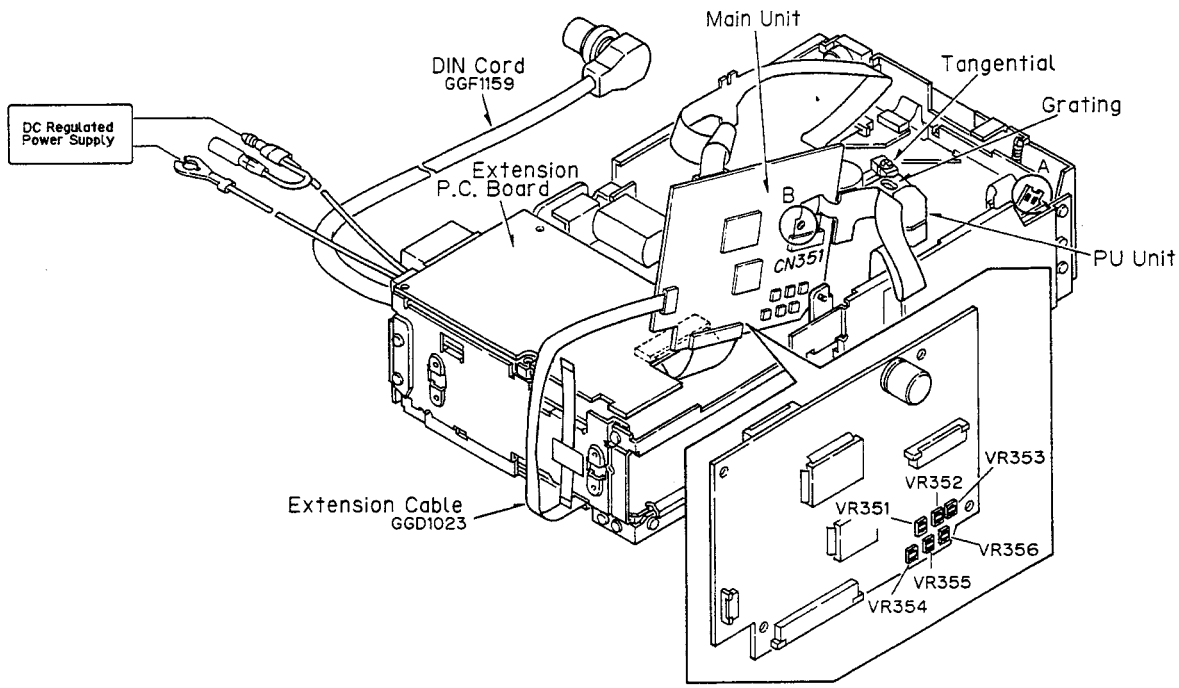



Fig. 9

| | |
|---|---|
| VR351 | FE BIAS |
| VR352 | RF OFFSET |
| VR353 | TE OFFSET |
| VR354 | TRACKING BALANCE |
| VR355 | FOCUS SERVO LOOP GAIN |
| VR356 | TRACKING SERVO LOOP GAIN |

Note: When pulling out the connector CN351, be sure to install a short pin in section A. Alternatively, the land in section B may be short-circuited (by soldering or the like). When the connector is insterted, be sure to disconnect it before the power is turned on.

## ●Test Point

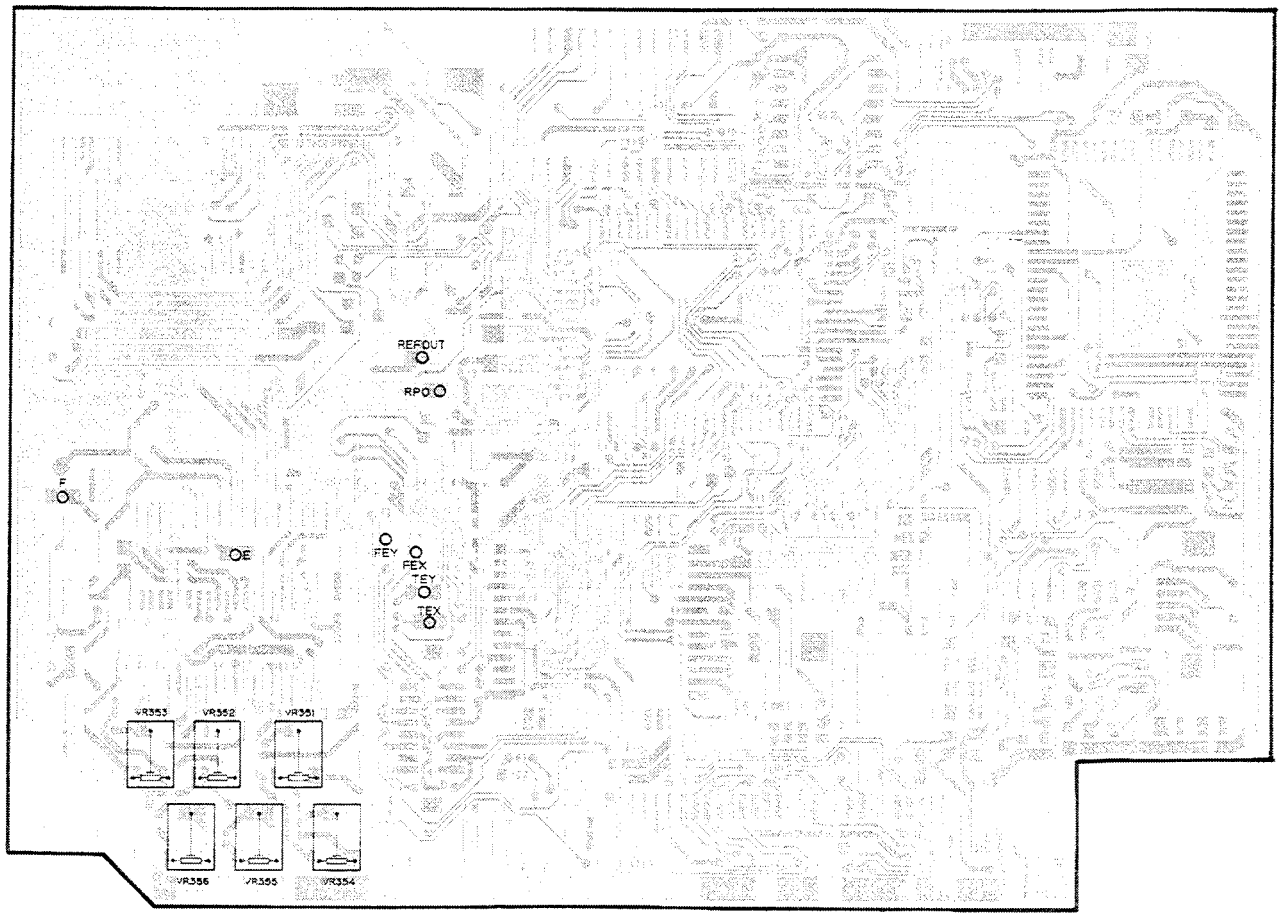
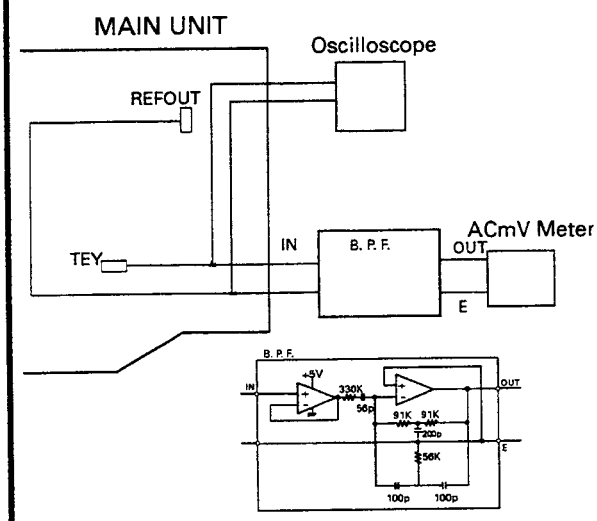



Fig. 10

## 1 Grating Adjustment-1 (Rough adjustment)

- Grating Adjustment-1 (rough adjustment and fine adjustment) may be performed in Grating Adjustment-2.
- **Purpose:**
  The grating may need adjustment in a replaced pick-up unit.
- **Maladjustment symptoms:**
  No disc playback, track jumping.

- **Measuring equipment / jigs:**
  Oscilloscope, clock driver, grating adjustment filter (bandpass filter) (GGF-133), AC milli-voltmeter
- **Measuring point:**
  TEY
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Test mode
- **Adjustment position:**
  Pick-up grating adjustment hole



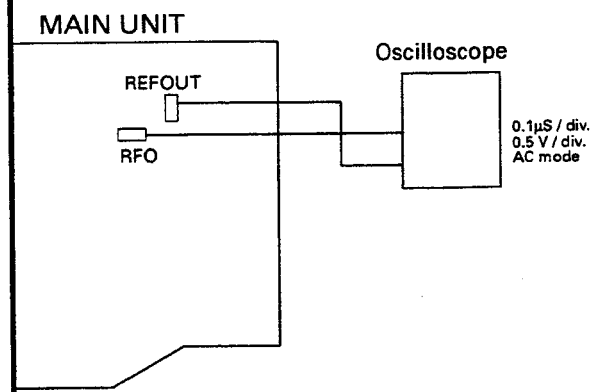

### Adjustment Procedure

1. In the test mode, set a test disc-loaded magazine and select the tray with a test disc.
2. Switch regulator ON .
3. Using the ▶▶| or |◀◀ key, move the pick-up to about the center of the test disc.
4. Press the **F•2** key to close focus.
5. While monitoring the TEY filter output by AC milli-voltmeter, turn the grating adjustment hole slowly.The AC voltage increases and decreases while turning the screw. Search for the minimum voltage level. (This corresponds to the position where the grating is on a track, and is referred to as the null point.)
6. Then while monitoring TEY by oscilloscope, turn the driver slowly clockwise from the null point (as seen from under the pick-up) until the first wave-form peak amplitude is reached.

## 2 Tangential Skew Check

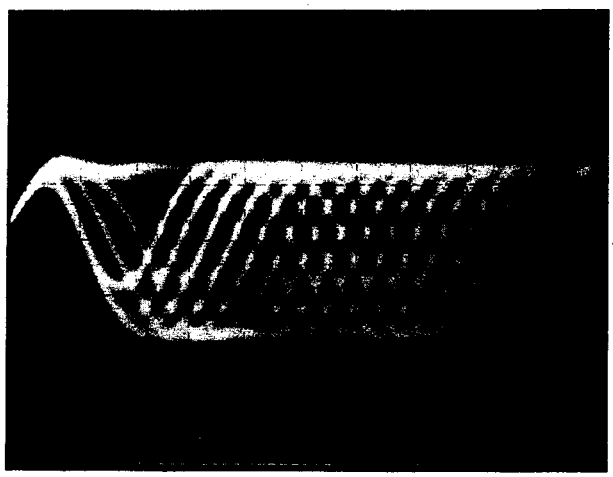
- **Purpose:**
  To check whether tangential skew has been misaligned or not when replacing the pick-up unit.
- **Maladjustment symptoms:**
  No disc playback, track jumping.

- **Measuring equipment / jigs:**
  Oscillosope, screwdriver
- **Measuring point:**
  RFO
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**
  Pick-up tangential adjustment screw




### Adjustment Procedure

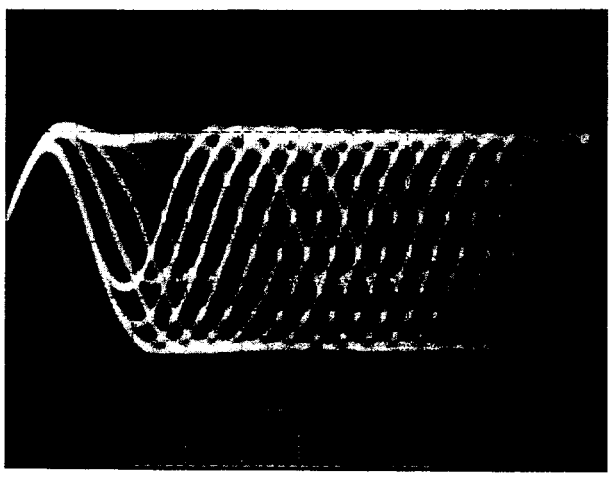
1. Play tune TNO 12 in normal mode. (ABEX TCD-782:TNO19)
2. Adjust the tangential adjustment screw so that the RF wave-form will have a level maximized and an eye pattern clearly viewed. Turn the adjustment screw both clockwise and counterclockwise to points where the eye pattern deteriorates, and take the midway point as the adjustment point. As a general guide, look for an overall clear waveform, and one of the diamond shapes in the eye pattern. The diamond shapes should appear in fine lines at the point of optimum adjustment. Take care not to knock the pick-up with the screwdriver at this stage. (This kind of accident can result in loss of focus.) (See Waveform.1,2)
3. Apply "screw-lock" to the tangential adjustment screw.
4. After adjusting tangential skew, also adjust the grating.



—REFOUT

NG

Waveform.1



—REFOUT

OK

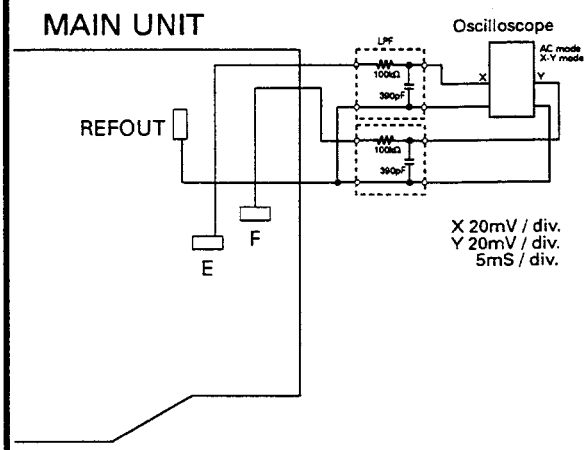
Waveform.2

0.5V/div.
0.5μs/div.
DC mode

## 3 Grating Adjustment-1(Fine adjustment)

- **Purpose:**
  The grating may need adjustment in a replaced pick-up unit.
- **Maladjustment symptoms:**
  No disc playback, track jumping.

- **Measuring equipment / jigs:**
  Oscilloscope, clock driver, two low-pass filters
- **Measuring point:**
  E LPF output, F LPF output
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Test mode
- **Adjustment position:**
  Pick-up grating adjustment hole



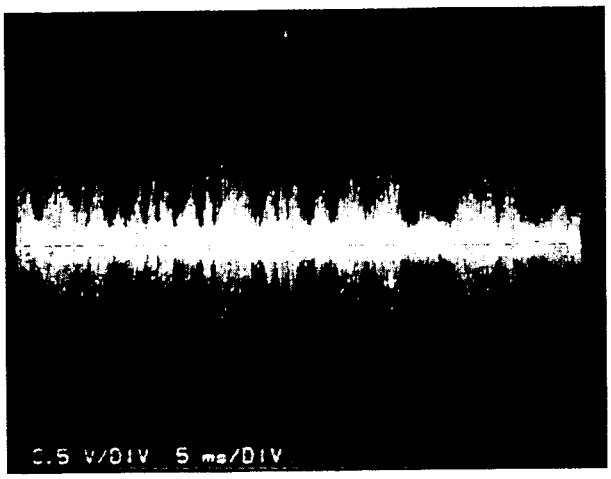

### Adjustment Procedure

1. Connect a low-pass filter as shown in the above diagram.
2. Switch regulator ON in test mode, and load a disc.
3. Using the ⏭ or ⏮ key,move the pick-up to about the center of the test disc.
4. Press the **F•2** key to close focus.
5. Using the driver, adjust the Lissajous figure to a single line (or as close as possible).
   (See Waveform.8 )
6. Switch regulator OFF and remove the filters.

TEY waveform 5ms/div., 500mV/div.

**Nul Point**

Lissajous figure (AC input)
Horizontal axis E 20mV/div.
Vertial axis F 20mV/div.

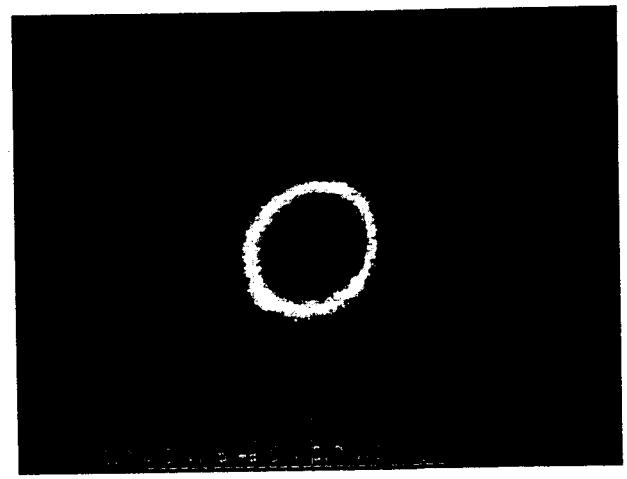



Waveform.3

Waveform.4

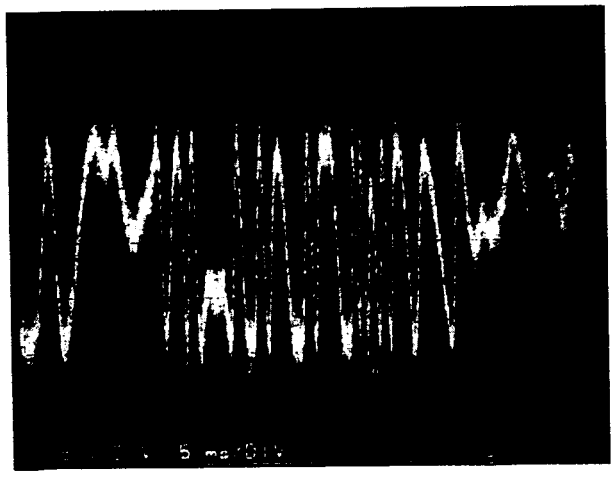
**"Rough" adjustment**

Waveform.5

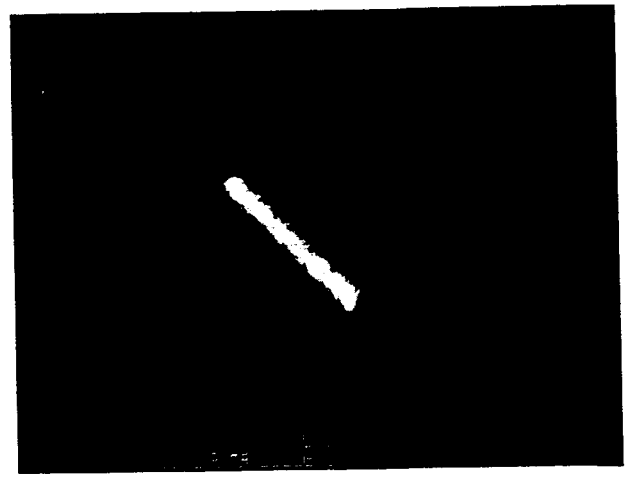


Waveform.6

**Final adjustment**



Waveform.7

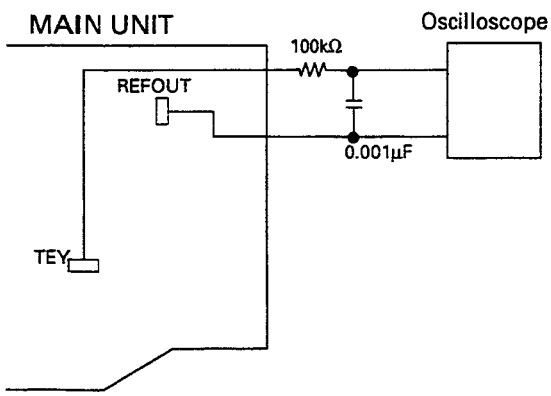


Waveform.8

## 4 Grating Adjustment-2

- Grating Adjustment-2 may be performed in Grating Adjustment-1 (rough adjustment and fine adjustment).
- **Purpose:**
  The grating may need adjustment in a replaced pick-up unit.
- **Maladjustment symptoms:**
  No disc playback, track jumping.

- **Measuring equipment / jigs:**
  Oscilloscope, grating adjustment driver, low-pass filter
- **Measuring point:**
  TEY
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Test mode
- **Adjustment position:**
  Pick-up grating adjustment hole




### Adjustment Procedure

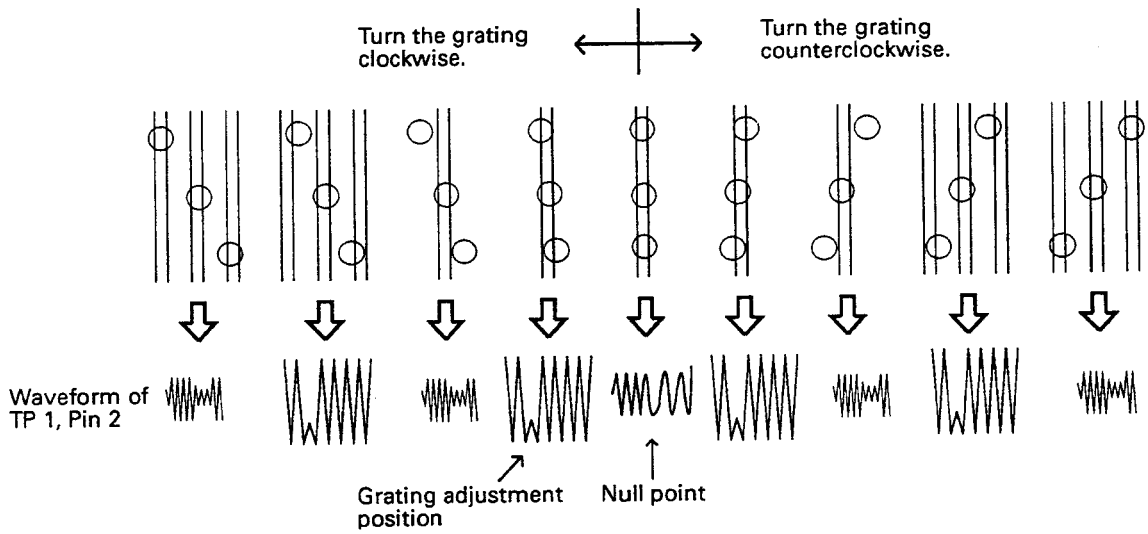
1. In the test mode, set a test disc-loaded magazine and select the tray with a test disc.
2. Switch regulator ON .
3. Using the ▶▶| or |◀◀ key, move the pick-up to center of the test disc.
4. Press the **F•2** key to close focus.
5. Insert the adjusting screwdriver in the slit for the pick-up grating adjustment and adjust the grating to seek out the null point. For details, see following page.
6. As the screwdriver is slowly turned clockwise from the null point, the amplitude of the waveform increases gradually. As the screwdriver continues to be turned, the amplitude of the waveform decreases again. Adjust the grating to a point at which the amplitude of the waveform first reaches the maximum while the screwdriver is turned clockwise from the null point.

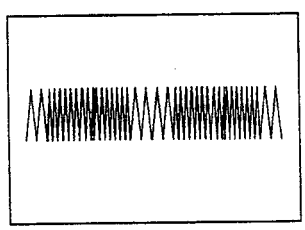
● **How to seek the null point**

When the screwdriver is inserted in the slit for grating adjustment while the angle of the grating is varied, the amplitude of the TEY tracking error signal varies.

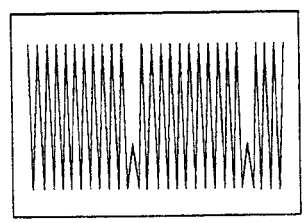
There are 5 or 6 positions where the amplitude of the waveform is decreased in the grating variable range. In only one of the waveform amplitude diminishing positions, the envelope is made smooth . This position denotes the state where three laser beams divided by the grating are aligned right on the same track.

This position is referred to as the null point. Adjust the grating to seek out the null point which is used as a reference position in performing the grating adjustment.

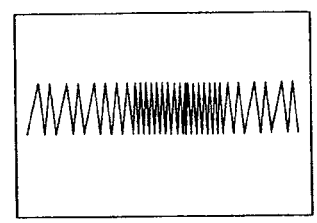


Waveform at null point



Waveform of maximum amplitude

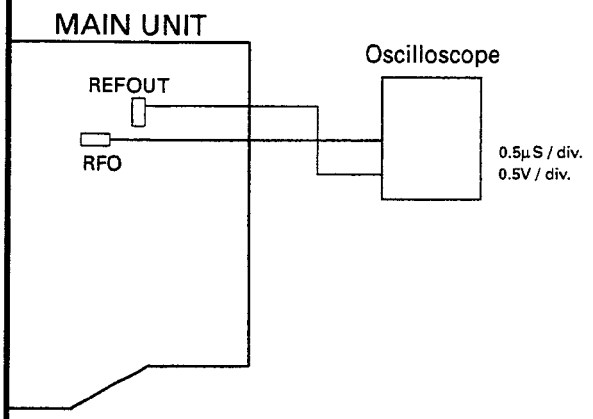


Waveform in positions other than null point

## 5 FE Bias Adjustment

- **Purpose:**
  To adjust the focus servo bias to an optimum value.
- **Maladjustment symptoms:**
  Focus closing difficulty, poor playability.

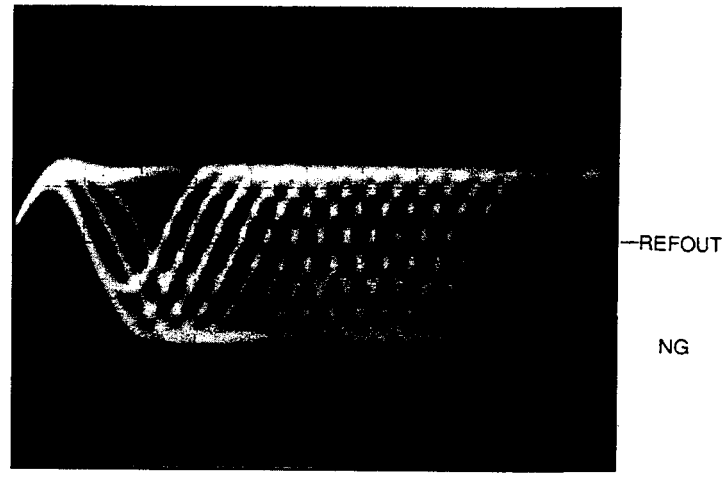
- **Measuring equipment / jigs:**
  Oscilloscope, volume adjustment driver
- **Measuring point:**
  RFO
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**
  VR351 (FEB)



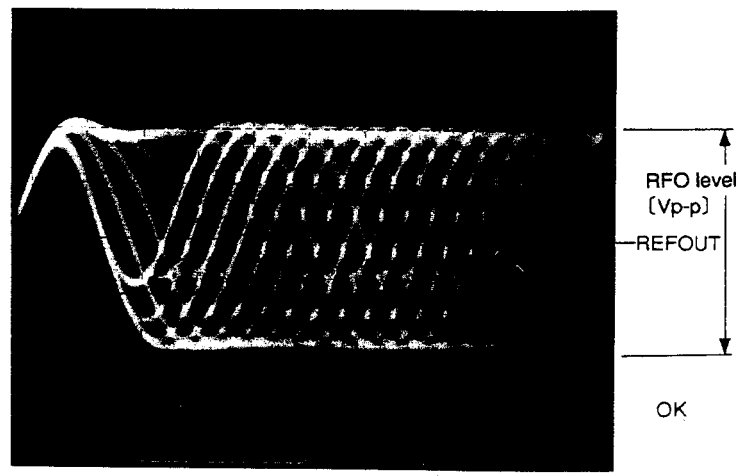

### Adjustment Procedure

1. Play tune TNO 12 in normal mode.(ABEX TCD-782:TNO 19)
2. Observe RFO in respect to REFOUT in the oscilloscope, and adjust VR351 (FEB) to obtain maximum RF and optimum eye pattern.(See Waveform. 9,10)
3. After adjustment, measure the RFO output level shown in Waveform.10 and take actions shown below.

| Output level | Action |
|---|---|
| 2.8Vp-p more than | Replace the pick-up |
| 1.2Vp-p - 2.6Vp-p | Normal |
| 1.2Vp-p less than | Replace the pick-up |

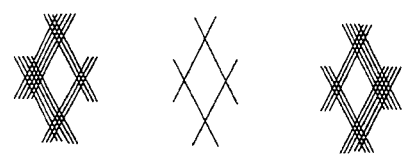



Waveform.9




Waveform.10

0.5V/div.
0.5μs/div.
DC mode

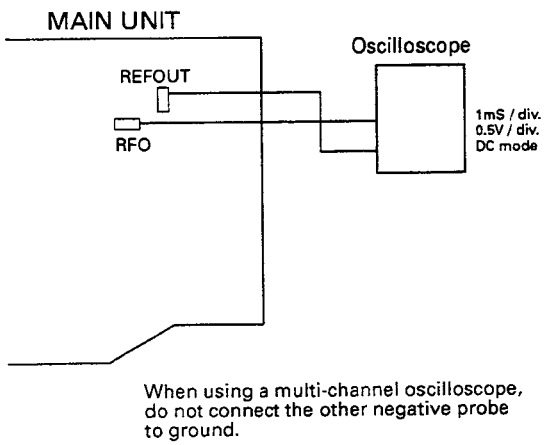


NG OK NG

## 6 RF Offset Adjustment

- **Purpose:**
  To adjust the RF amplifier offset to a suitable value.
- **Maladjustment symptoms:**
  Focus closure fails readily.

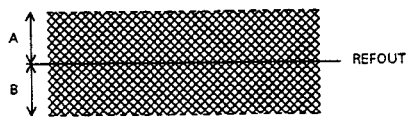
- **Measuring equipment / jigs:**
  Oscilloscope, volume adjustment driver
- **Measuring point:**
  RFO
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**
  VR352 (RFO)




When using a multi-channel oscilloscope, do not connect the other negative probe to ground.

### Adjustment Procedure

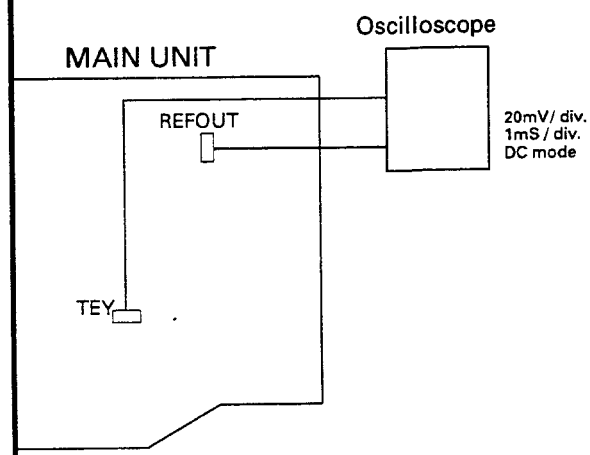
1. Play tune TNO 12 in normal mode.(ABEX TCD-782:TNO 19)
2. Using VR352 to adjust the RFO waveform so that REFOUT appears at the center.(A-B must not exceed 100 mV.)




## 7 TE Offset Adjustment-1

- **Purpose:**
  To adjust the electrical offset of the tracking servo to zero.
- **Maladjustment symptoms:**
  Search times too long, carriage run-away.

- **Measuring equipment / jigs:**
  DC voltmeter or oscilloscope, volume adjustment driver
- **Measuring point:**
  TEY
- **Test disc and setting:**
  Enpty magazine Test mode
- **Adjustment position:**
  VR353



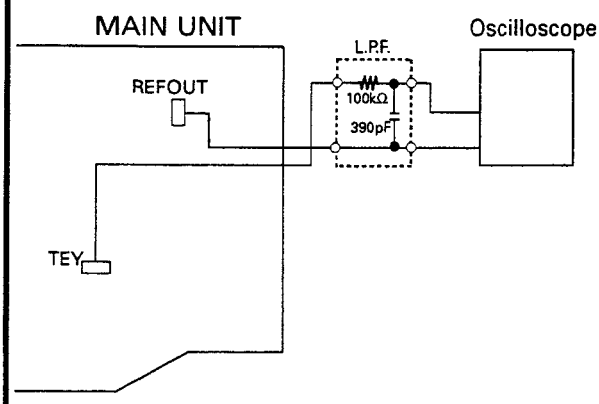

### Adjustment Procedure

1. Select a tray without a disk, while in test mode.
2. Switch regulator ON.
3. Using VR353, adjust the TEY output DC voltage in reference to REFOUT to a value of 0±25mV.
4. Switch regulator OFF.

## 8 Tracking Balance Adjustment-1

- **Purpose:**
  To adjust the tracking servo offset to zero.
- **Maladjustment symptoms:**
  Search times too long, poor playability, carriage run-away.

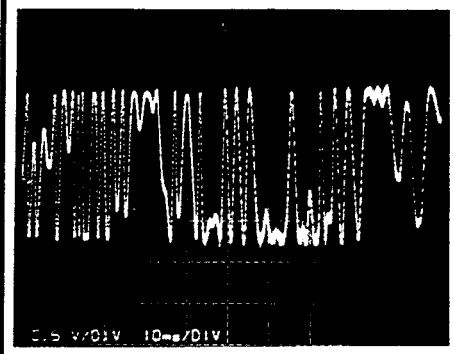
- **Measuring equipment / jigs:**
  Oscilloscope,volume adjustment driver
- **Measuring point:**
  TEY (Tracking error signal)
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Test mode
- **Adjustment position:**
  VR354 (T.BAL)

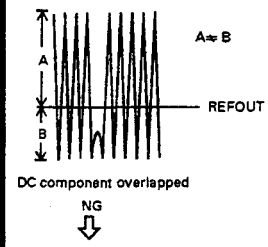



### Adjustment Procedure

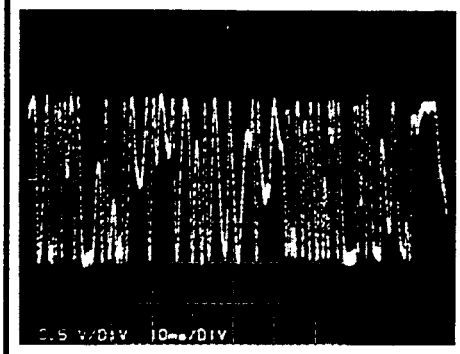
1. After checking that regulator is OFF, connect the low-pass filter as shown in the diagram.
2. Set the test disc. Switch regulator ON.
3. Using the ⏭ or ⏮ key, move the pick-up to about the center of the signal surface.
4. Press the **F•2** key to close focus.
5. Using an oscilloscope, observe the TEY signal in respect to REFOUT.
   Then adjust VR354 (T.BAL)to set the positive and negative amplitudes to the same levels.
   (See Waveform.11-13)
6. Switch the power OFF.

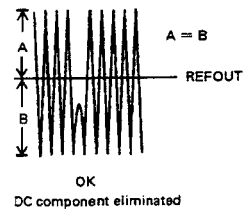
TEY waveform
0.5V/div.
10ms/div.



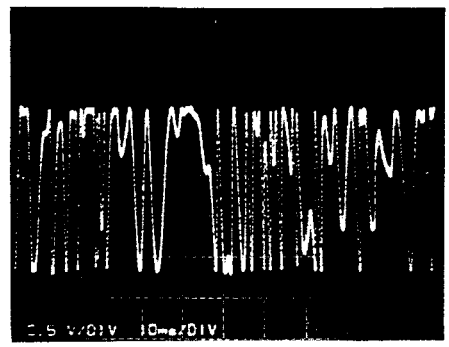


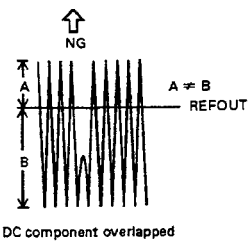

Waveform.11






Waveform.12



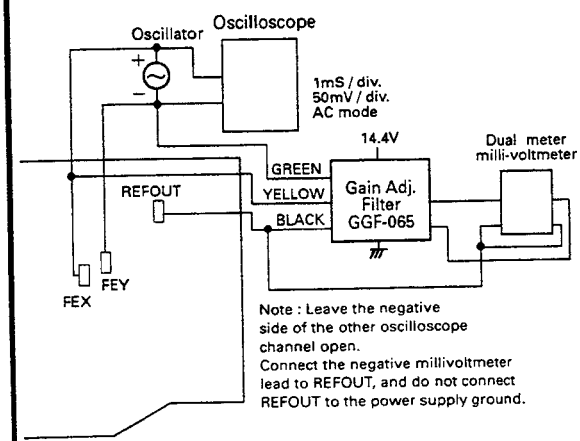



Waveform.13

## 9 Focus Servo Loop Gain Adjustment-1

- Focus Servo Loop Gain Adjustment-1 may be performed in Focus Servo Loop Gain Adjustment-2.
- **Purpose:**
  To adjust the focus servo loop gain to an optimum value.
- **Maladjustment symptoms:**
  Poor playability, reduced resistance to vibration, focus closure fails readily.

- **Measuring equipment / jigs:**
  Oscillator, gain adjustment filter (GGF-065), oscilloscope, dual meter milli-voltmeter, volume adjustment driver
- **Measuring point:**
  FEX, FEY
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**
  VR355




MAIN UNIT

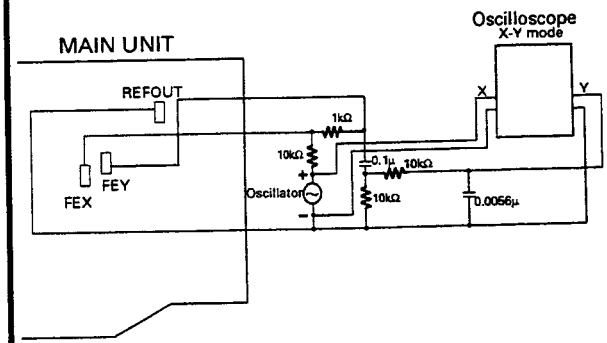
### Adjustment Procedure

1. After checking that the power is OFF, connect the gain adjustment filter and measuring equipment as shown in the above diagram.
2. Play tune TNO 12 in normal mode.(ABEX TCD-782 :TNO 19)
3. Set the oscillator to 1kHz,and observe the FEX/FEY output in the oscilloscope. Adjust the oscillator output to obtain a FEX/FEY output of 100mVp-p.
4. Adjust VR355 to obtain a milli-voltmeter difference of 0±0.5dB.

## 10 Focus Servo Loop Gain Adjustment-2

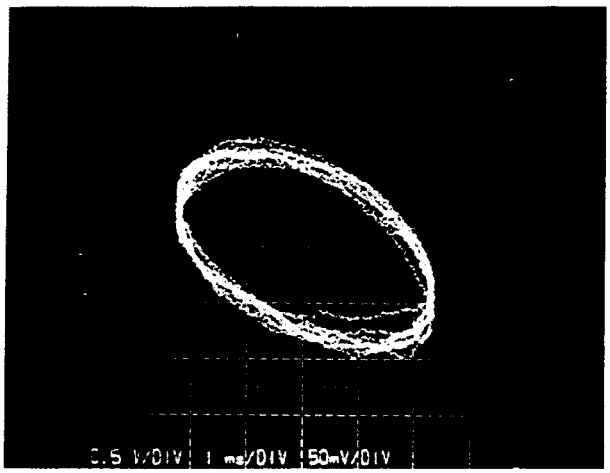
- **Purpose:**
  To adjust the focus servo loop gain to an optimum value.
- **Maladjustment symptoms:**
  Poor playabillity, reduced resistance to vibration, focus closure fails readily.

- **Measuring equipment / jigs:**
  Oscillator, gain adjustment filter, oscilloscope
- **Measuring point:**
  FEX, FEY
- **Test disc and setting**
  SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**
  VR355




### Adjustment Procedure

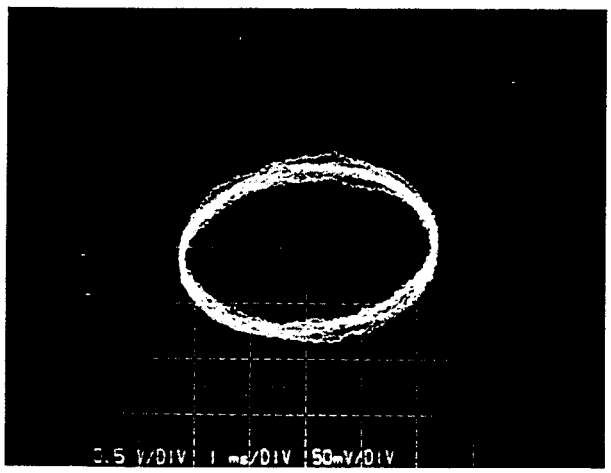
1. After checking that the power is OFF, connect the gain adjustment filter and measuring equipment as shown in the above diagram.
2. Play tuneTNO 12 in normal mode.(ABEX TCD-782:TNO 19)
3. Set the oscillator at 1kHz and adjust the output of the oscillator to 2Vp-p.
4. Adjust VR355 to make the Lissajou's figure of waveform symmetrical about X and Y axes respectively.



High-level gain

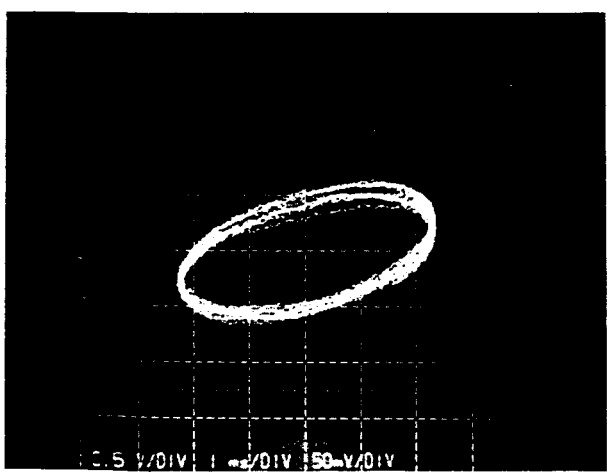
Focus
X=0.5V/div.
Y=50mV/div.
1ms/div.

Waveform.14



Optimum gain

Waveform.15



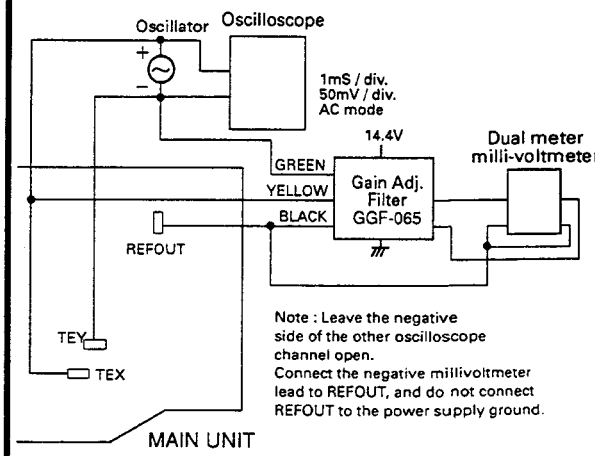
Low-level gain

Waveform.16

## 11 Tracking Servo Loop Gain Adjustment-1

- Tracking Servo Loop Gain Adjustment-1 may be performed in Tracking Servo Loop Gain Adjustment-2.
- **Purpose:**
  To adjust the tracking servo loop gain to an optimum value.
- **Maladjustment symptoms:**
  Poor playability, reduced resistance to vibration.

- **Measuring equipment / jigs:**
  Oscillator, gain adjustment filter(GGF-065), oscilloscope, dual meter milli-voltmeter, volume adjustment driver
- **Measuring point:**
  TEX, TEY
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**
  VR356



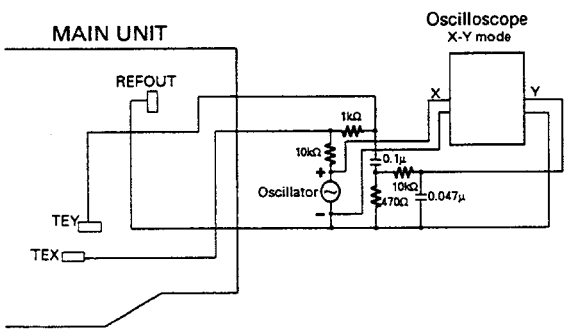

### Adjustment Procedure

1. After checking that the power is OFF, connect the gain adjustment filter and measuring equipment as shown in the above diagram.
2. Play tune TNO 12 in normal mode.(ABEX TCD-782:TNO19)
3. Set the oscillator to 1.4kHz, and observe the TEX/TEY output in the oscilloscope. Adjust the oscillator output to obtain a TEX/TEY output of 300mVp-p.
4. Adjust VR356 to obtain a milli-voltmeter difference of 0±0.5dB.

## 12 Tracking Servo Loop Gain Adjustment-2

- **Purpose:**
  To adjust the tracking servo loop gain to an optimum value.
- **Maladjustment symptoms:**
  Poor playability, reduced resistance to vibration.

- **Measuring equipment / jigs:**
  Oscillator, gain adjustment filter, oscilloscope
- **Measuring point:**
  TEX, TEY
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Normal mode
- **Adjustment position:**
  VR356



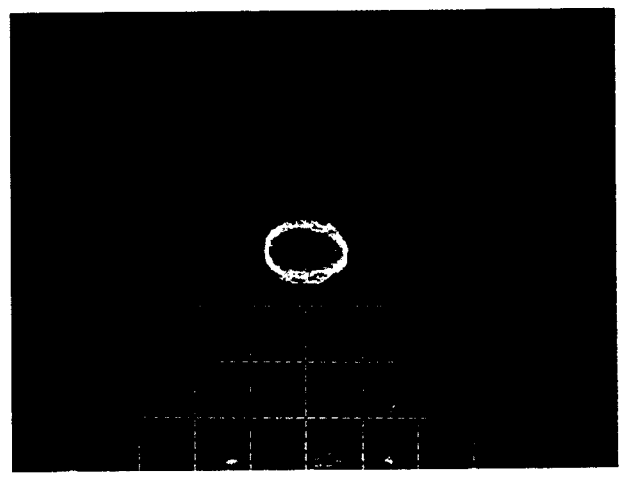

### Adjustment Procedure

1. After checking that the power is OFF, connect the gain adjustment filter and measuring equipment as shown in the above diagram.
2. Play tune TNO 12 in normal mode.(ABEX TCD-782:TNO19)
3. Set the oscillator at 1.4kHz and adjust the output of the oscillator to 5Vp-p.
4. Adjust VR356 to make the Lissajou's figure of waveform symmetrical about X and Y axes respectively.

High-level gain

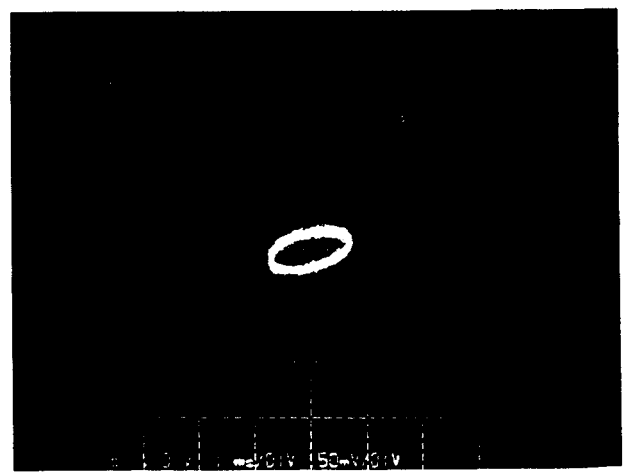
Tracking
X=5V/div.
Y=50mV/div.
2ms/div.

Waveform.17



Optimum gain

Waveform.18



Low-level gain

Waveform.19

## 13 TE Offset Adjustment-2

- **Purpose:**
  To adjust the electrical offset of the tracking servo to zero.
- **Maladjustment symptoms:**
  Search times too long, carriage run-away.

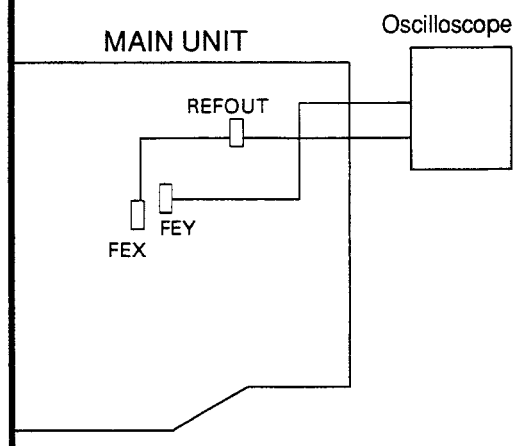
- **Measuring equipment / jigs:**
  DC voltmeter or oscilloscope, volume adjustment driver
- **Measuring point:**
  TEY
- **Test disc and setting:**
  No Disc Test mode
- **Adjustment position:**
  VR353

**Adjustment Procedure**
Same as for TE offset adjustment-1, but with the DC voltage of the TEY output adjusted to 0±50mV.
The purpose of this additional adjustment is to correct any deviations generated when carrying out the tracking balance and tracking servo loop gain adjustments after completing TE offset adjustment-1.

## 14 Checking FEY Level

- **Purpose:**
  Check the focus error level.
- **If the level is insufficient:**
  Focus is hard to close and the playability is worsened.

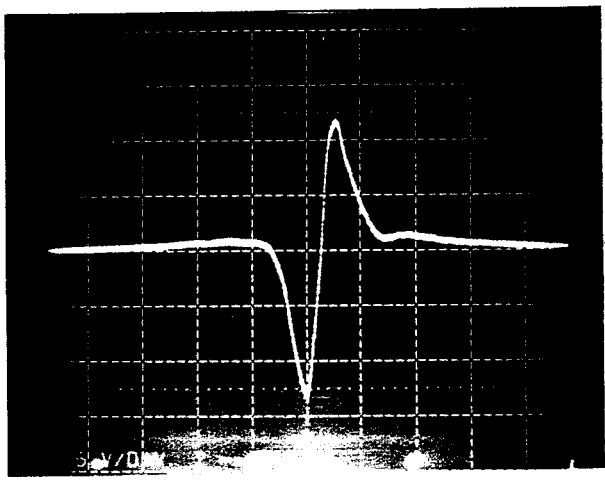
- **Measuring equipment / jigs:**
  Oscilloscope
- **Measuring point:**
  FEY
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Test mode



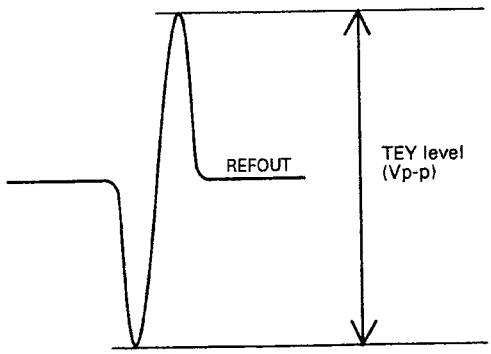

**Checkout Procedure(This checkout always must be performed after gain adjustment.)**

1. Connect the oscilloscope to REFOUT and FEY. Connect FEX to REFOUT.
2. In the test mode, set a test disc-loaded magazine and select a tray with a test disc.
3. Switch regulator ON.
4. Using the ▶▶| or |◀◀ key, move the pick-up to the center of the test disc.
5. Press the **F•2** key to close focus. During this action, the disc repeats acceleration and deceleration.
6. Observe the FEY waveform and measure the FEY level.
7. Switch regulator OFF.
8. Disconnect FEX and REFOUT.

**Normal level of FEY:2.0Vp-p more than**
If the level is less than the above, examine the peripheral circuits of the unit or replace the pick-up.




Waveform.20




In addition to the waveform shown above, the FEY level output produces another waveform like ⊣⊢ . However, take measurement only of the above figure of waveform.

## 15 Tracking Balance Adjustment-2 and Checking TEY Level

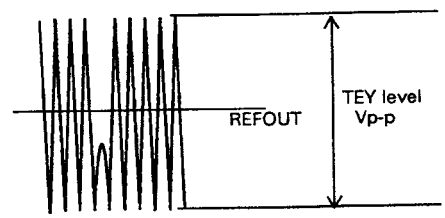
- **Purpose:**
  To adjust the tracking servo offset to zero.
- **Maladjustment symptoms:**
  Search times too long, poor playability, carriage run-away.

- **Measuring equipment / jigs:**
  Oscilloscope,
  volume adjustment driver
- **Measuring point:**
  TEY (Tracking error signal) L.P.F. output
- **Test disc and setting:**
  SONY TYPE 4 (or ABEX TCD-782) Test mode
- **Adjustment position:**
  VR354

**Adjustment Procedure**

Steps 1 through 5 are the same as the steps taken in the tracking balance adjustment-1.

6. Check to see that the level of positive and negative amplitudes of TEY signal. If there is deviation, make adjustment using VR354.
7. After adjustment measure the TEY level. (Measurement always should be made afrer the tracking gain adjustment is completed. Before the adjustment, normal level measurement cannot be achieved.)



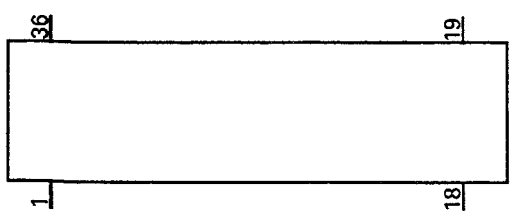

**Normal range of TEY level:2.0±0.5Vp-p**

If the level is out of the above range, examine the peripheral circuits of the unit or replace the pick-up.

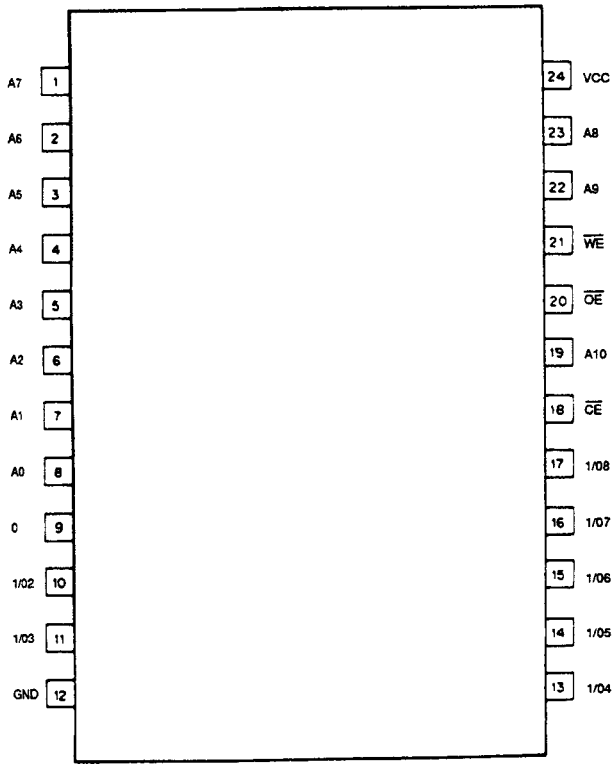
●ICs
●Pin Functions (UPC1347GS)

| Pin No. | Pin Name | I/O | Function and Operation |
|---|---|---|---|
| 1 | VCC | | |
| 2 | BP- | I | Vibration detect amplifier 1 inverter input |
| 3 | BPO | O | Vibration detect amplifier 1 output |
| 4 | WC+ | I | Window comparator non-inverting input |
| 5 | WC- | I | Window comparator inverting input |
| 6 | GND | | GND |
| 7 | QDH | I | Vibration detect amplifier 3 non-inverting input |
| 8 | QDO | O | Vibration detect amplifier 3 output |
| 9 | A | I | A signal input |
| 10 | C | I | C signal input |
| 11 | B | I | B signal input |
| 12 | D | I | D signal input |
| 13 | E | I | E signal input |
| 14 | F | I | F signal input |
| 15 | PIN | I | APC circuit PD amplifier input |
| 16 | LA | O | APC circuit LD amplifier output |
| 17 | LAON | | Laser diode ON/OFF switching |
| 18 | VREF1 | | Reference voltage |
| 19 | GND2 | | GND |
| 20 | RF+ | I | RF amplifier non-inverting input |
| 21 | RFS | O | RF summing virtual output |
| 22 | RF- | I | RF amplifier inverting input |
| 23 | NC | | Not used |
| 24 | RFO | O | RF amplifier output |
| 25 | APC- | I | APC circuit PD amplifier inverting |
| 26 | TE2+ | I | Tracking error amplifier 2 non-inverting input |
| 27 | APCO | O | APC circuit PD amplifier output |
| 28 | TE1O | O | Tracking error amplifier 1 output |
| 29 | TE2- | I | Tracking error amplifier 2 inverting input |
| 30 | TE2O | O | Tracking error amplifier 2 output |
| 31 | VREF2 | | Reference voltage |
| 32 | FE2+ | I | Focus error amplifier 2 non-inverting input |
| 33 | FE1+ | I | Focus error amplifier 1 non-inverting input |
| 34 | FE1O | O | Focus error amplifier 1 output |
| 35 | FE2- | I | Focus error amplifier 2 inverter input |
| 36 | FE2O | O | Focus error amplifier 2 output |

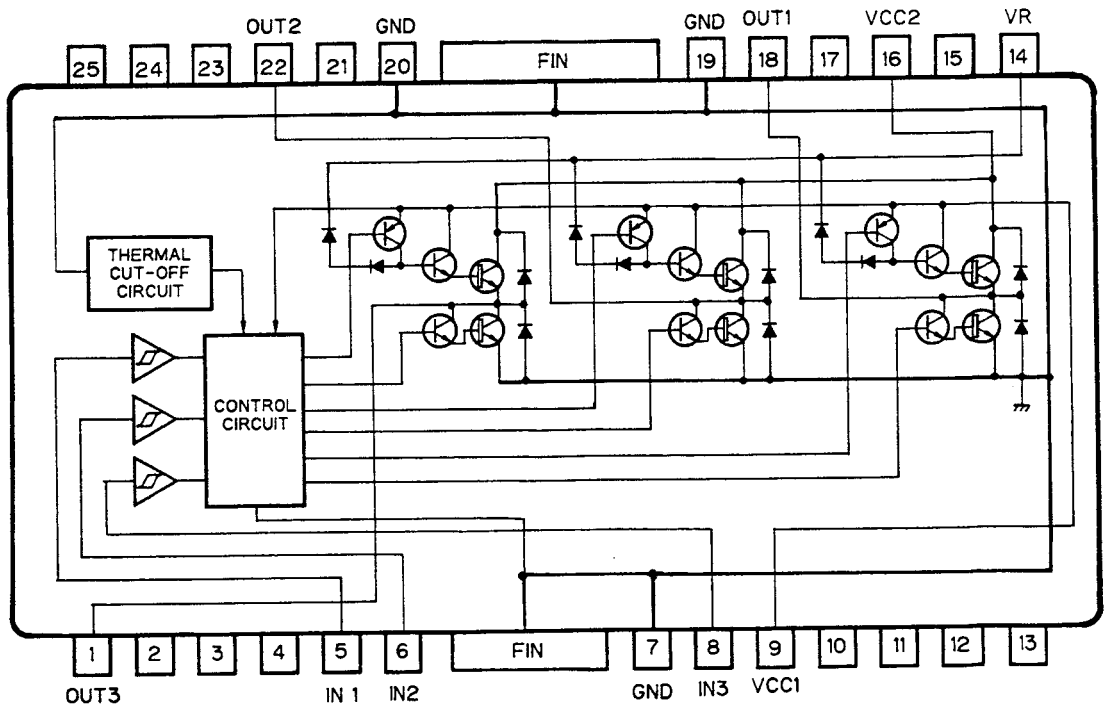
IC351:UPC1347GS



IC752:LH5116HN-10T



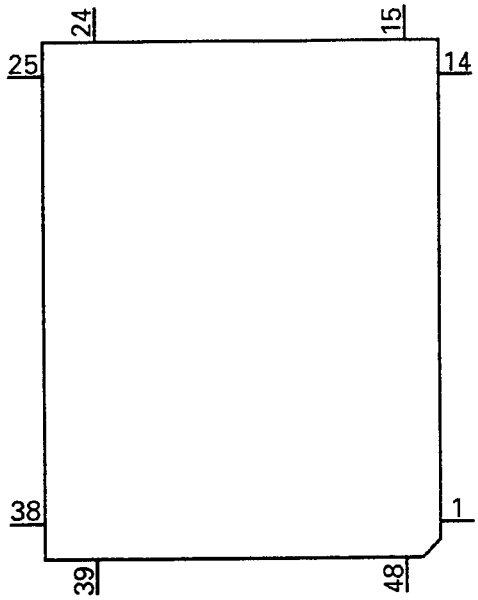

IC801:XRA6247FP



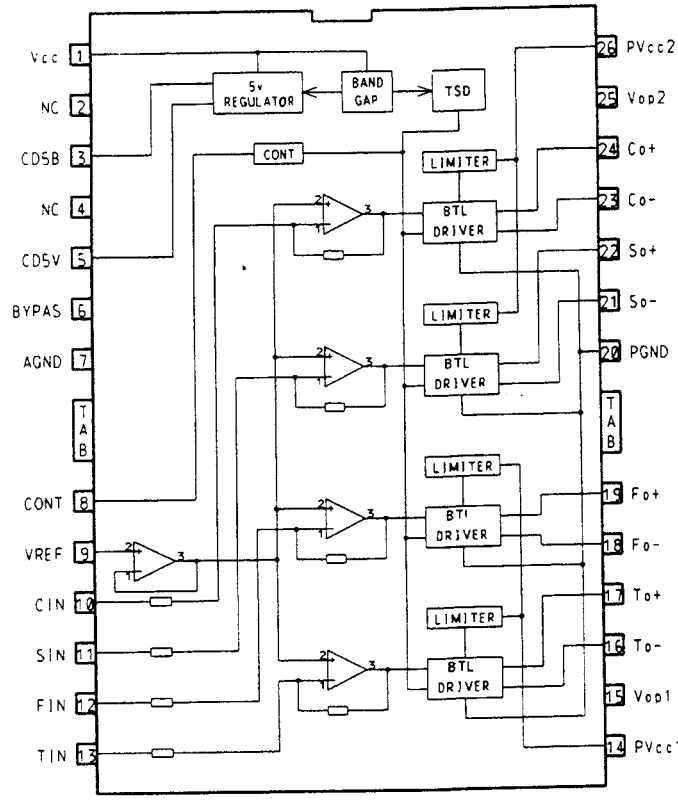
●Pin Functions (UPD6374AGH)

| Pin No. | Pin Name | I/O | Function and Operation |
|---|---|---|---|
| 1 | VDD | | Power supply |
| 2 | OUTSEL | I | Sets PWM output mode for the motor system |
| 3 | $\overline{SCK}$ | I | Clock input terminal for serial data input and output |
| 4 | SI | I | Serial data input |
| 5 | SO | O | Serial data and status signal output |
| 6 | $\overline{STB}$ | I | Signal latching serial data inside LSI |
| 7 | A0 | I | Used in combination with stb |
| 8 | $\overline{RST}$ | I | System reset |
| 9 | DGND | | Logic circuit GND terminal |
| 10 | LOCK | I | Input terminal for detection of spindle servo error signal |
| 11 | MDR | I | Input terminal for detection of spindle servo error signal |
| 12 | MDF | I | Input terminal for detection of spindle servo error signal |
| 13 | WFCK | I | Input terminal for detection of spindle servo error signal |
| 14 | RFCK | I | Input terminal for detection of spindle servo error signal |
| 15 | AVDD | | Positive power supply terminal for analog circuit |
| 16 | EFM | O | EFM signal output terminal |
| 17 | ASI | I | Level comparing input for RF signal comparison |
| 18 | RFI | I | Analog input terminal for EFM comparator |
| 19 | REFOUT | O | A/D converter midpoint output terminal inside LSI |
| 20 | AGND | | Analog circuit GND |
| 21 | RF | O | RF signal input terminal |
| 22 | FE | I | Focus error terminal |
| 23 | TE | I | Tracking error input terminal |
| 24 | VR | I | Input signal is quantified as follows:FS=88.2kHz,Resolution:6 bits<br>The output takes place directly at microcomputer interface, that is, not via the filter block within LSI. |
| 25 | AVDD | | Positive power supply terminal for analog circuit |
| 26 | TECO | I | Tracking comparator input terminal |
| 27 | TECI | I | Tracking comparator input terminal |
| 28 | DVDD | | Positive power supply terminal for logic circuit |
| 29 | FF | O | PWM positive output terminal for the focus loop filter |
| 30 | FR | O | PWM negative output terminal for the focus loop filter |
| 31 | TF | O | PWM positive output terminal for the tracking loop filter |
| 32 | TR | O | PWM negative output terminal for the tracking loop filter |
| 33 | DGND | | Logic circuit GND terminal |
| 34 | SF | O | PWM positive output terminal for the thread loop filter |
| 35 | SR | O | PWM negative output terminal for the thread loop filter |
| 36 | MF | O | PWM positive output terminal for the spindle loop filter |
| 37 | MR | O | PWM negative output terminal for the spindle loop filter |
| 38 | DVDD | | Positive power supply terminal for logic circuit |
| 39 | T7 | I | Sets tracking PWM output mode |
| 40 | T6 | I | Sets focus PWM output mode |
| 41 | T5 | I | Selects motor modulation mode |
| 42 | T4 | I | Selects between focus and tracking modulation mode |
| 43 | MIRR | O | MIRR detection signal output terminal |
| 44 | RFOK | O | RFOK detection signal terminal |
| 45 | HOLD | I | Hold control signal input terminal |
| 46 | TBC | | Tracking bank switching terminal |
| 47 | CKIN | I | System clock input terminal |
| 48 | $\overline{TEST}$ | I | Test terminal |

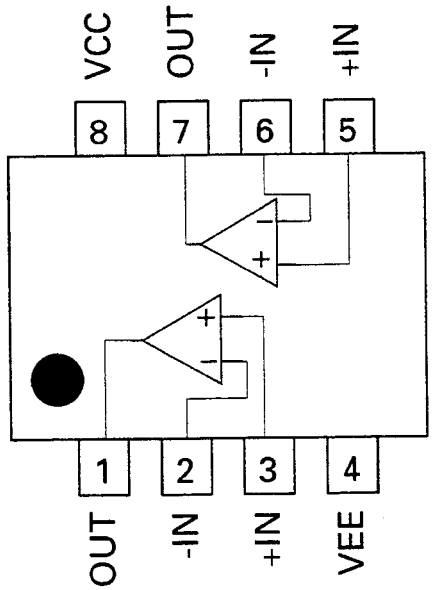
IC601:UPD6374AGH



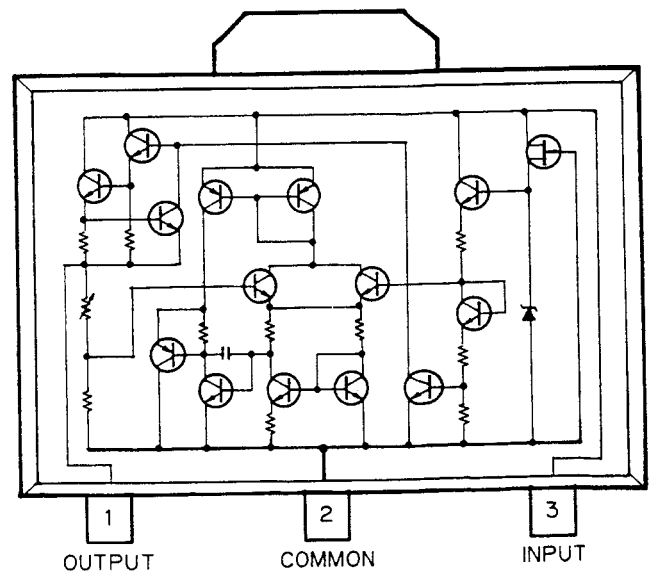

IC651:PA3026




IC602,652:NJM4558MD



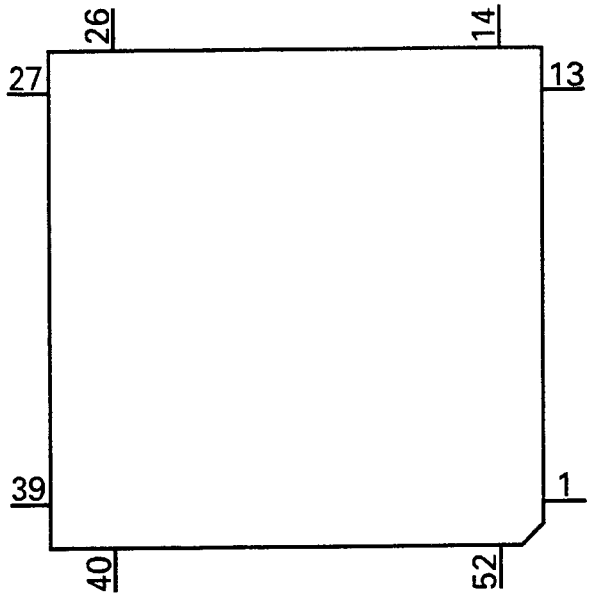

IC661:TA78L05F



●Pin Functions (UPD6375GC)

| Pin No. | Pin Name | I/O | Function and Operation |
|---|---|---|---|
| 1 | NC | | Not used |
| 2 | WDCK | O | Output terminal for signal having double the frequency of LRCK |
| 3 | C4LR | O | Output terminal for signal having four the frequency of LRCK |
| 4 | RFCK | O | Oscillation clock divider signal,output pin for signal giving 1-frame sync. |
| 5 | EFMI | I | EFM signal input terminal |
| 6 | TEST | | Test terminal |
| 7 | VSS | | Gnd |
| 8 | C1D1 | O | Output terminal indicating C1 error correction status |
| 9 | C1D2 | O | Output terminal indicating C1 error correction status |
| 10 | C2D1 | O | Output terminal indicating C2 error correction status |
| 11 | C2D2 | O | Output terminal indicating C2 error correction status |
| 12,13 | NC | | Not used |
| 14 | STBY | I | Standby input terminal |
| 15 | NC | | Not used |
| 16 | PLK1 | O | VCO output terminal for use in analog PLL selection |
| 17 | VDD | | 5V |
| 18 | PLK8 | I | VCO output terminal for use in analog PLL selection |
| 19 | PLCK | O | Bit clock monitor terminal |
| 20 | VSS | | Gnd |
| 21 | POUT | O | Output terminal for phase comparison between EFM signal and bit clock |
| 22 | WFCK | O | Signal issuring one-frame period by bit clock dividing signal |
| 23 | VDD | | 5V |
| 24 | MDS | O | Signal indicating spindle motor CLV servo control output status |
| 25 | MDF | O | Spindle motor CLV servo control positive direction output terminal |
| 26 | MDR | O | Spindle motor CLV servo control negative direction output terminal |
| 27 | LOCK | O | "H" when synchronisation signal & frame counter output coincide at EFM demodulator. |
| 28 | $\overline{RST}$ | I | Reset signal input terminal |
| 29 | A0 | O | Control signal distinguishing data from microcomputer |
| 30 | $\overline{STB}$ | I | Signal latching serial data inside LSI |
| 31 | SO | | Serial data input terminal |
| 32 | SI | I | Input terminal for data from microcomputer |
| 33 | VSS | | Gnd |
| 34 | $\overline{SCK}$ | I | Clock input terminal serial data input |
| 35 | TX | O | Digital audio interface data output terminal |
| 36 | MUT/EMP | O | Output for mute command decoding signal or sub-Q command pre-emphasis data |
| 37 | SFSY | O | Signal indicating subcode one-frame synchronisation |
| 38 | SBSY | O | Signal indicating head of subcode block |
| 39 | SBCK | I | Subcode data read clock input terminal |
| 40 | SBSO | O | Subcode data output terminal |
| 41 | VDD | | 5V |
| 42 | $\overline{XTAL}$ | O | Oscillation continuation terminal |
| 43 | XTAL | I | Oscillation continuation terminal |
| 44 | VSS | | Gnd |
| 45 | C16M | O | Oscillation clock output terminal |
| 46 | VDD | | 5V |
| 47 | C4M | O | 1/4 cycle output terminal for oscillation clock signals |
| 48 | FLAG | O | Flag sig. indicating that the current audio data output of incorrectable data |
| 49 | SCKO | O | Clock output terminal for audio serial data |
| 50 | DOUT | O | Serial audio data output terminal |
| 51 | LRCK | O | Signal distinguishing between left and right channel DOUT terminal output |
| 52 | NC | | Not used |

IC701:UPD6375GC



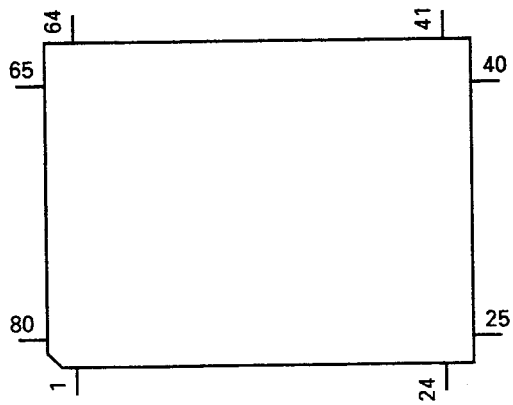
●Pin Functions (PD5230A)

| Pin No. | Pin Name | I/O | Output Format | Function and Operation |
|---|---|---|---|---|
| 1 | $\overline{TIN}$ | I | C | Tray position input |
| 2 | TEMP | | | Temperature detector |
| 3 | VDIN | | | Power supply short sensor input |
| 4 | $\overline{C/D}$ | O | NM | Command/data appointment output |
| 5 | DCS | O | NM | Chip select output |
| 6 | DRDY | I | C | Ready input |
| 7 | DRST | O | NM | Reset |
| 8 | A0 | O | NM | LSI data control signal |
| 9 | XSCK | I/O | NM | LSI clock input/output |
| 10 | XSO | O | NM | LSI data output |
| 11 | XSI | I | C | LSI data input |
| 12 | $\overline{STB}$ | O | C | LSI Strobe output |
| 13 | $\overline{RST}$ | O | C | LSI reset output |
| 14–16 | NC | | | Not used |
| 17 | $\overline{BSENS}$ | I | | Back up power sense input |
| 18 | $\overline{BRST}$ | I | | P-BUS reset input |
| 19 | $\overline{BSRQ}$ | O | C | P-BUS service request output pin |
| 21 | $\overline{BSCK}$ | I/O | C | P-BUS serial clock input/output |
| 22 | BSO | O | C | P-BUS serial data output |
| 23 | BSI | I | | P-BUS serial data input |
| 24 | $\overline{EJSW}$ | I | | Eject signal input |
| 25 | $\overline{MAG}$ | I | | Magazine lock switch |
| 26 | CNVSS | I | | GND |
| 27 | $\overline{RESET}$ | I | | Reset input |
| 28 | EJLED | O | C | LED output for Eject |
| 29 | DCLOSE | I | C | Door close SW input |
| 30 | XIN | I | | Crystal oscillating element connection pin |
| 31 | XOUT | O | C | Crystal oscillating element connection pin |
| 32 | VSS | | | GND |
| 32–40 | D7-D0 | I/O | C | External RAM data line |
| 41 | POWER | O | C | CD +5V control |
| 42 | CONT | O | C | Servo driver power supply control |
| 43 | WE | O | C | External RAM write enable |
| 44 | PROT | O | C | External RAM output enable |
| 45 | CS | O | C | External RAM chip select |
| 46–56 | A10-A0 | O | C | External RAM address line |
| 57 | $\overline{EJP}$ | I | C | Eject position switch |
| 58 | 6/12 | I | C | 6/12 switching input |
| 59 | FECNT | I/O | C | DEFECT port |
| 60 | MIRR | I | C | Mirror detector input |
| 61 | LOCK | I | C | Spindle lock detector input |
| 62 | FOK | I | C | FOK signal input |
| 63 | $\overline{HOME}$ | I | C | Home position detector input |
| 64 | OPTSW | I | C | Digital output ON/OFF input |
| 65 | LOAD | O | C | Mechanism power supply control |
| 66 | I3 | O | C | Motor driver control output |
| 67 | I1 | O | C | Motor driver control output |
| 68 | I2 | O | C | Motor driver control output |
| 69 | ENDOUT | O | C | Digital output enable signal |
| 70 | CDMUTE | O | C | CD mute output |
| 71 | ADENA | O | C | A/D reference voltage output |
| 72 | $\overline{TESTIN}$ | I | C | Test program mode input |
| 73 | VCC | | | |
| 74 | VREF | I | | A/D reference voltage input |
| 75 | AVSS | | | A/D GND |

| Pin No. | Pin Name | I/O | Output Format | Function and Operation |
|---|---|---|---|---|
| 76 | CSEL | I | | Compression select |
| 77 | NC | | | Not used |
| 78 | DISK | | | Disc detector input |
| 79 | TSEL | I | C | Tray position detector photo sensor |
| 80 | $\overline{\text{TOUT}}$ | I | C | Disc sensor timing input |

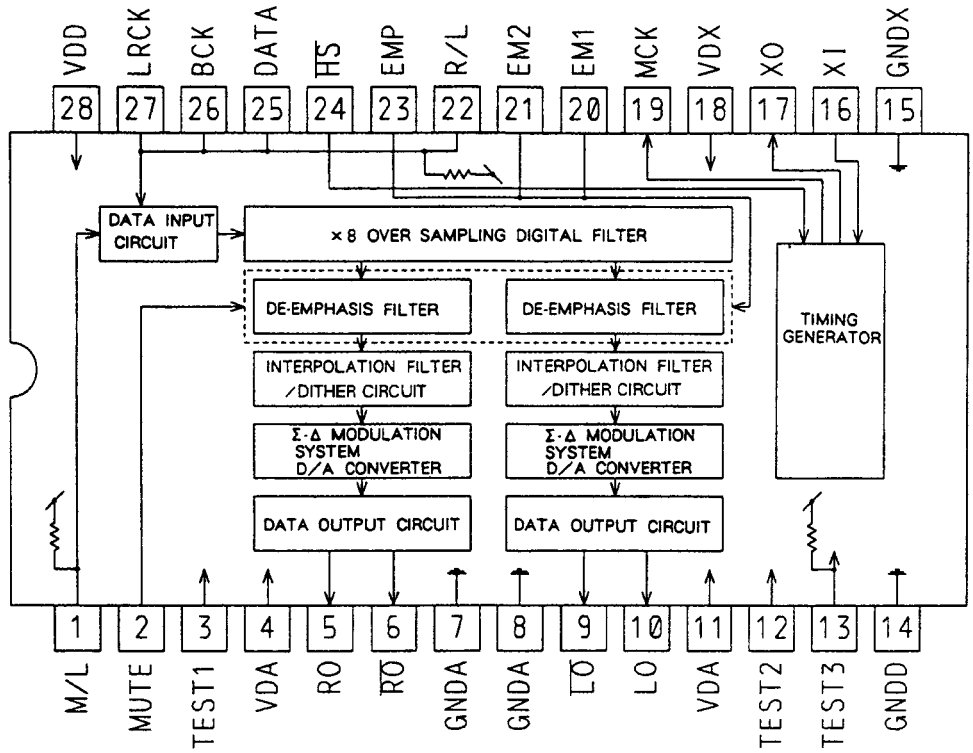
| Output Format | Meaning |
|---|---|
| C | CMOS output |
| NM | Middle resistivity<br>N channel open drain |

*IC751:PD5230A

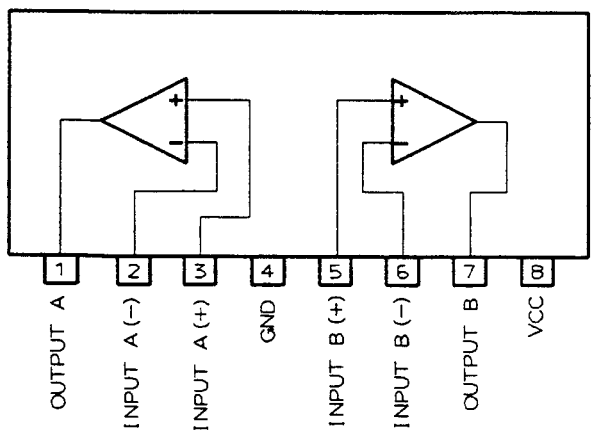



IC's marked by* are MOS type.
Be careful in handing them because they are very liable to be damaged by electrostatic induction.

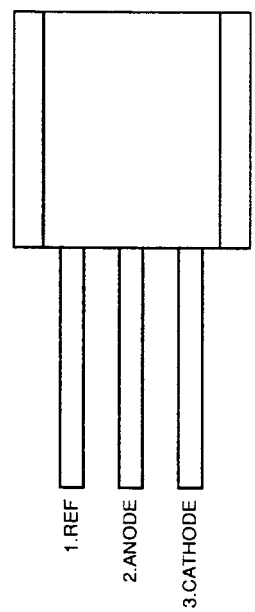
IC851:TC9237BN



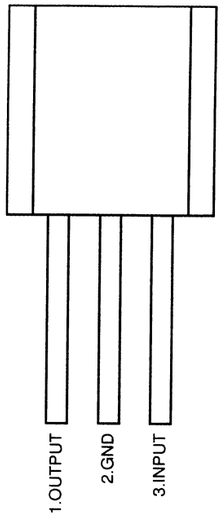

IC853,854:M5218AL



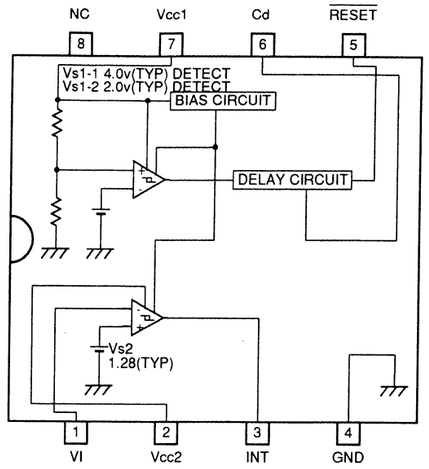

IC981:NJM431L



IC982:NJM78L05A




IC983:M62009P

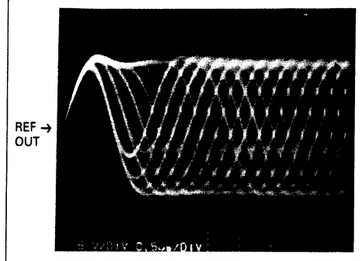




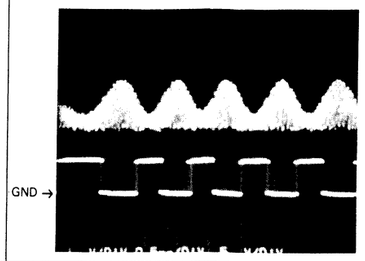

## ●Wave Forms

Note: 1. The encircled numbers denote measuring pointes in the circuit diagram.
2. Reference voltage
REFOUT: 2.5V

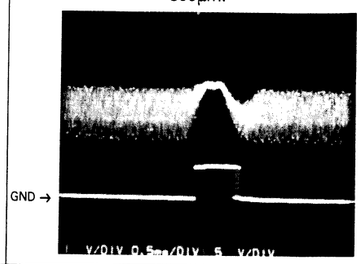
① RFO 0.5V/div. 0.5μs/div.
Normal mode: play



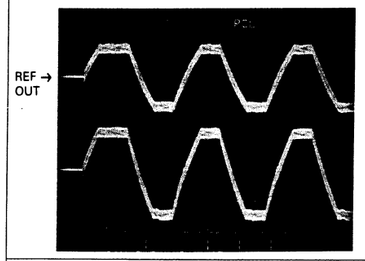

① CH1: RFO 1V/div.
② CH2: MIRR 5V/div. 0.5ms/div.
Test mode: Tracking open



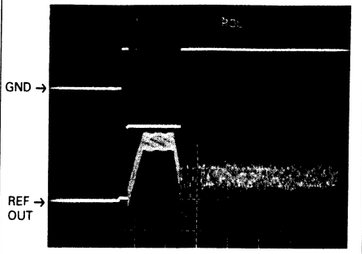

① CH1: RFO 1V/div.
② CH2: MIRR 5V/div. 0.5ms/div.
Normal mode: The defect part passes 800μm.



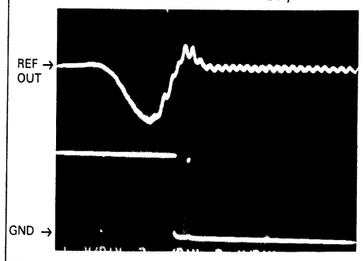

③ CH1: FIN 1V/div.
④ CH2: FOUT+ 2V/div. 0.5s/div.
Test mode: Connect the FEX to REFOUT.
Focus search is performed.



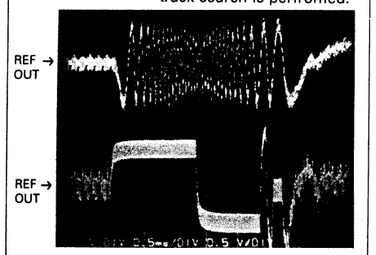

⑤ CH1: FOK 2V/div.
③ CH2: FIN 0.5V/div. 0.5s/div.
Normal mode: Focus close



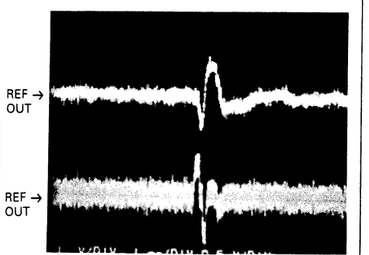

⑥ CH1: FEY 1V/div.
⑦ CH2: XSO 2V/div. 2ms/div.
Normal mode: Focus close
(The lens moves DOWN → UP)



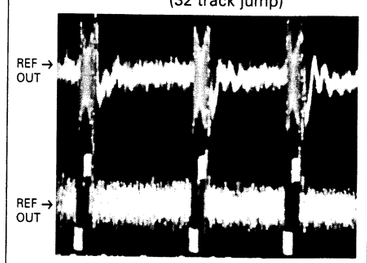

⑧ CH1: TEY 1V/div.
⑨ CH2: TIN 0.5V/div. 0.5ms/div.
Normal mode: Brake wave from when track search is perfromed.




⑧ CH1: TEY 1V/div.
⑨ CH2: TIN 0.5V/div. 1ms/div.
Normal mode: single jump

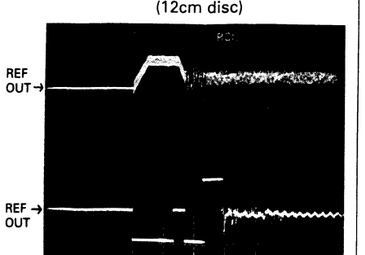



⑧ CH1: TEY 0.5V/div.
⑨ CH2: TIN 0.5V/div. 5ms/div.
Normal mode: Track search
(32 track jump)

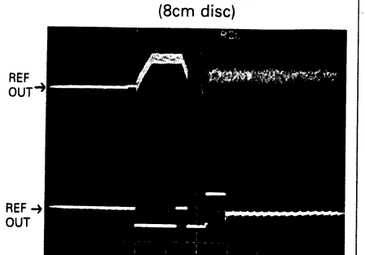



⑥ CH1: FEY 0.2V/div.
③ CH2: FIN 0.5V/div. 20ms/div.
Normal mode: Play

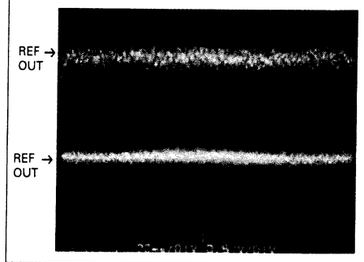
③ CH1: FIN 0.5V/div.
⑩ CH2: SIN 1V/div. 0.5s/div.
Normal mode: Focus search
(12cm disc)




③ CH1: FIN 0.5V/div.
⑩ CH2: SIN 1V/div. 0.5s/div.
Normal mode: Focus search
(8cm disc)

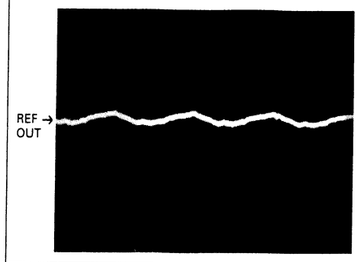


⑧ CH1: TEY 0.5V/div.
⑨ CH2: TIN 0.5V/div. 20ms/div.
Normal mode: Play

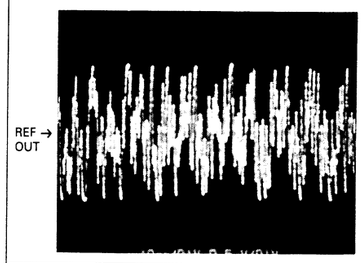



⑧ CH1: TEY 1V/div. 5ms/div.
㉓ CH2: CIN
Normal mode: Search

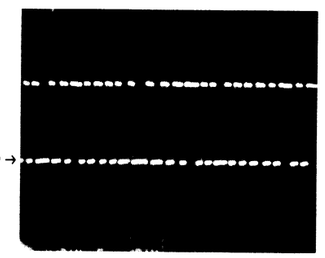
⑩ SIN 0.5V/div. 50ms/div.
Normal mode: Play (12cm disc)



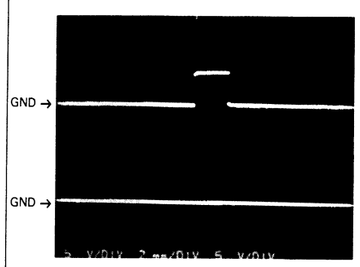

⑩ SIN 0.5V/div. 10ms/div.
Search (12cm disc)



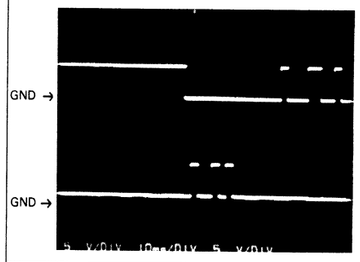

⑪ EFM 2V/div. 5µs/div.
Play



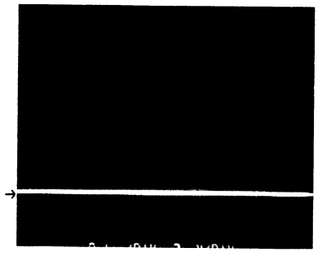

⑫ CH1: MDF 5V/div.
⑬ CH2: MDR 5V/div. 2ms/div.
Play



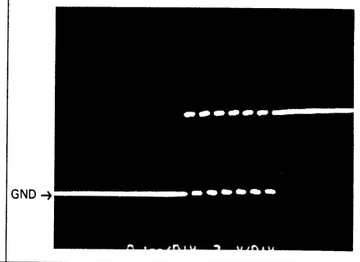

⑫ CH1: MDF 5V/div.
⑬ CH2: MDR 5V/div. 10ms/div.
Search



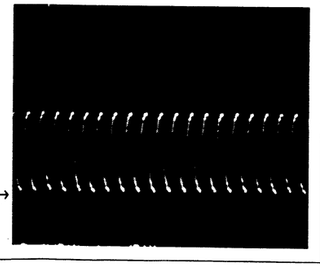

⑭ FLAG 2V/div. 0.1ms/div.
Play



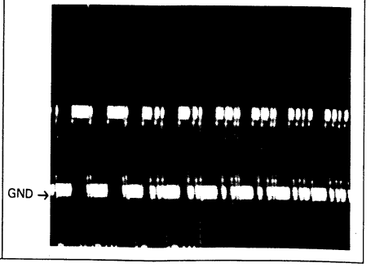

⑭ FLAG 2V/div. 0.1ms/div.
Search




⑯ BCLK1 2V/div. 1µs/div.
Play

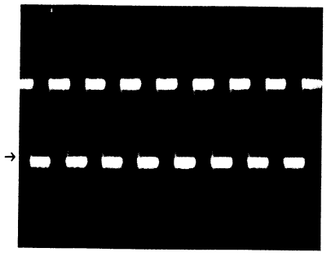



⑰ Dout 2V/div. 10µs/div.
Play

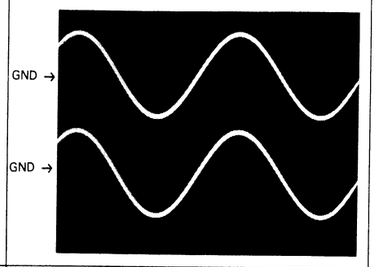





⑱ LRCK 2V/div 20µs/div.
Play

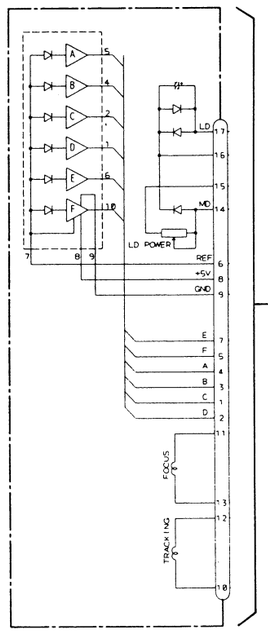



㉑ CH1: L CH 1V/div.
㉒ CH2: RCH 1V/div. 0.2ms/div.
Play (1kHz)



# 5. CONNECTION DIAGRAM(1)

**PU UNIT**



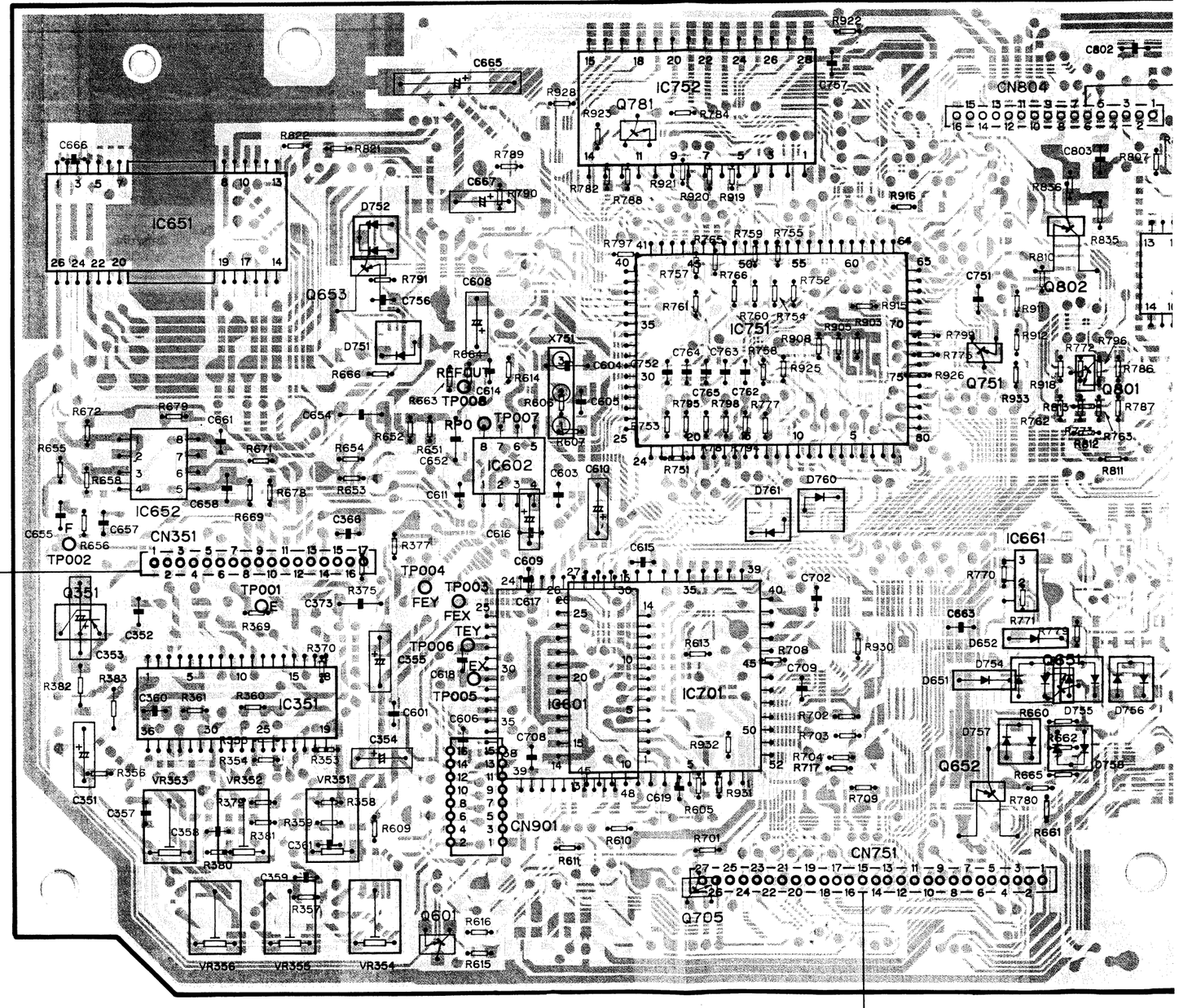

→ MAIN UNIT CN351

PU UNIT →

**MAIN UNIT**

IC, Q Q351 IC651 IC652 IC351 Q653 Q601 IC602 IC601 Q781 IC752 IC701 IC751 Q705 Q751 Q652 IC661 Q802 Q801 Q651

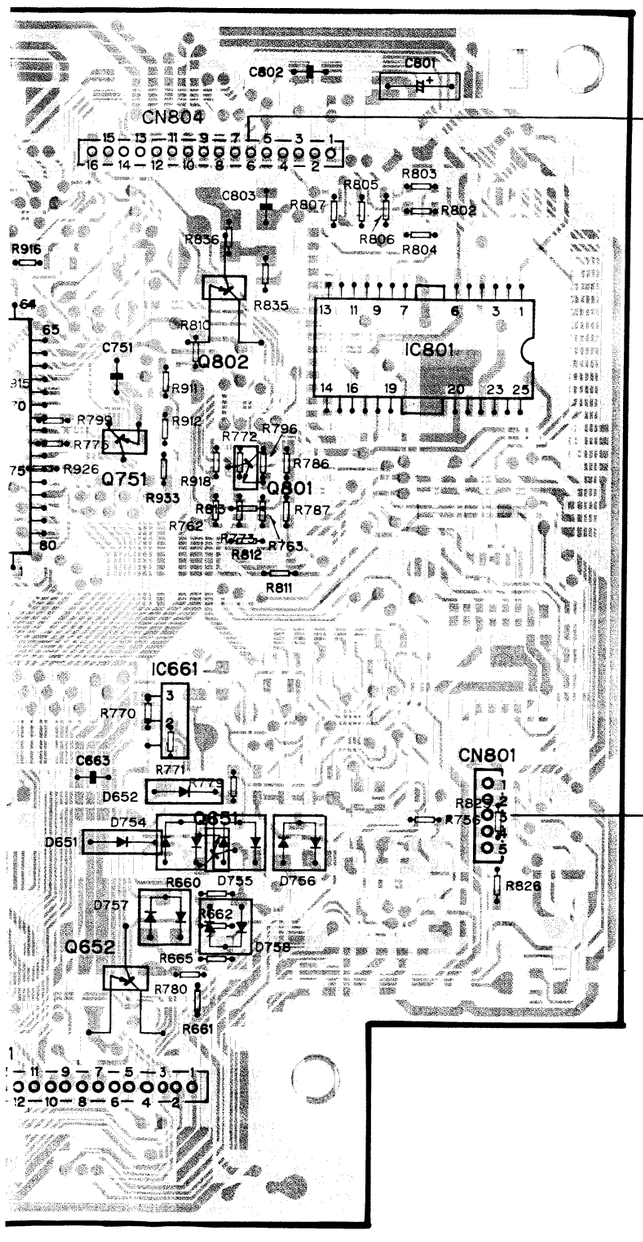
ADJ VR353 VR352 VR351 VR356 VR355 VR354




→ EXTENSION P.C. BOARD CN984

IC801

Q751 Q802 Q801
Q652 IC661 Q651




**MECHANISM P.C. BOARD**

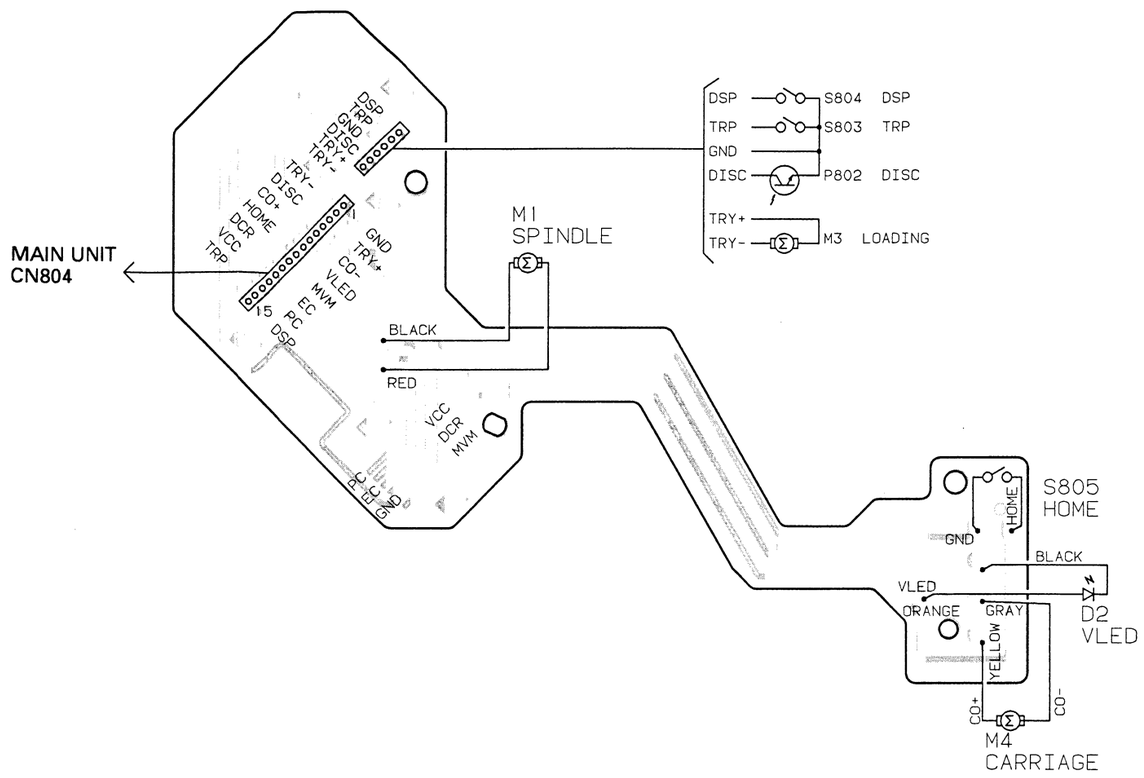



**PHOTO P.C. BOARD**

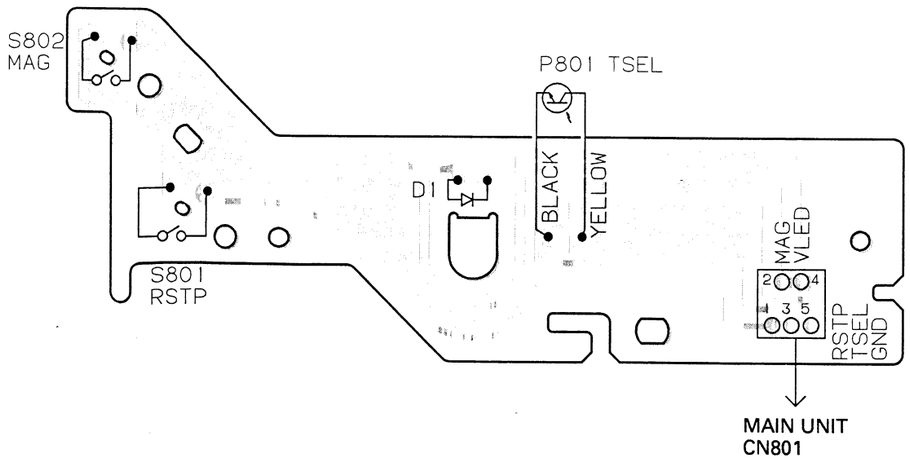
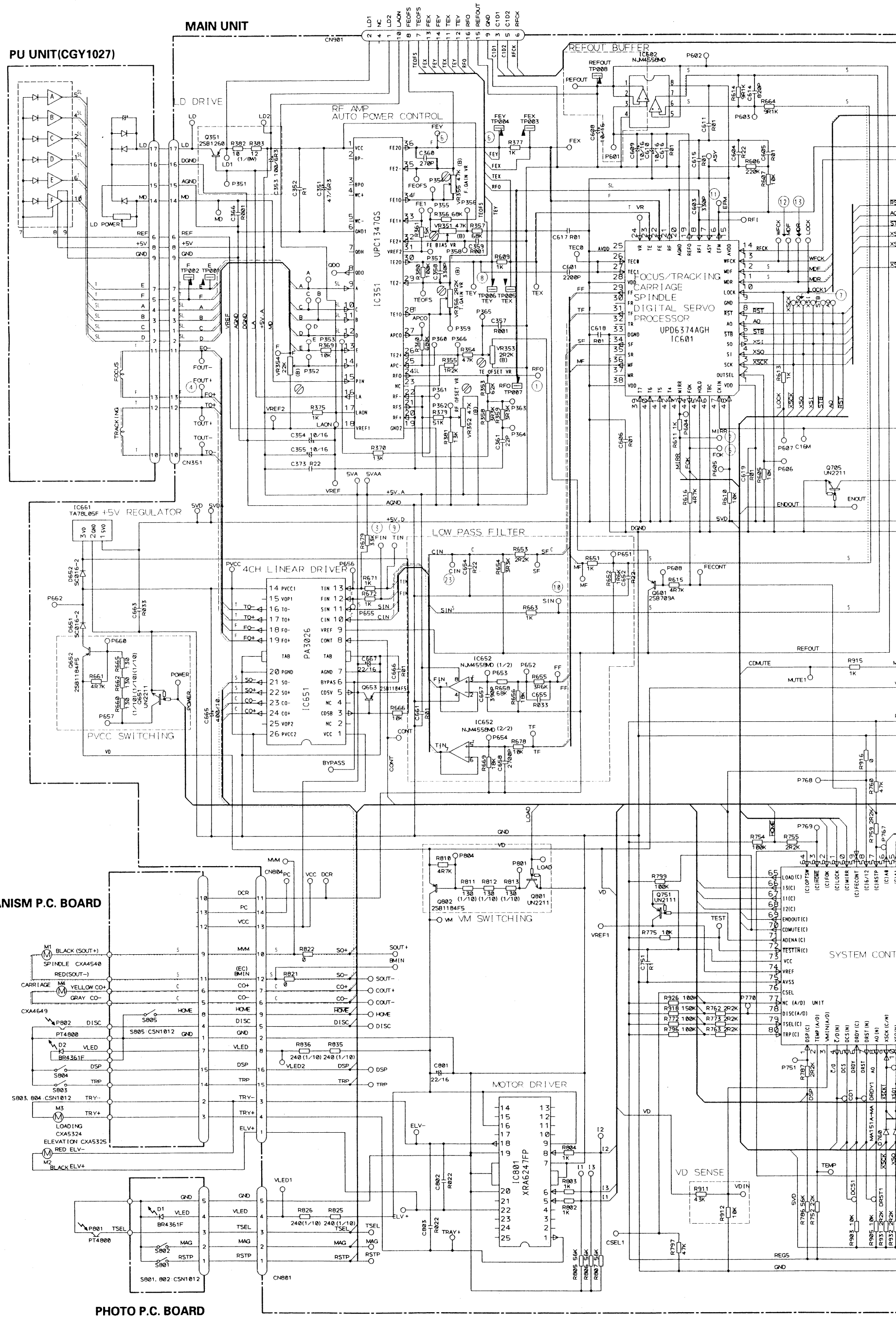



Fig. 11

# 6. SCHEMATIC CIRCUIT DIAGRAM(1)

Pioneer CDX-M6

SL SIGNAL LINE
F FOCUS SERVO LINE
T TRACKING SERVO LINE
C CARRIAGE SERVO LINE
S SPINDLE SERVO LINE



SWITCHES:
MECHANISM P.C.BOARD
S805 HOME SWITCH ON-OFF
PHOTO P.C.BOARD
S801 RSTP SWITCH ON-OFF
S802 MAG SWITCH ON-OFF
MISCELLANEOUS
S803 TRP SWITCH ON-OFF
S804 DSP SWITCH ON-OFF

The underlined indicates the switch position.

NOTE:
- Symbol indicates a resistor. No differentiation is made between chip resistors and discrete resistors.
- Symbol indicates a capacitor. No differentiation is made between chip capacitors and discrete capacitors.

Decimal points for resistor and capacitor fixed values are expressed as:
2.2→2R2
0.022→R022

IC751 PD5230A
SYSTEM CONTROLLER

IC752 LH5116HN-10T
SRAM

IC701 UPD6375GC
DIGITAL SIGNAL PROCESSOR

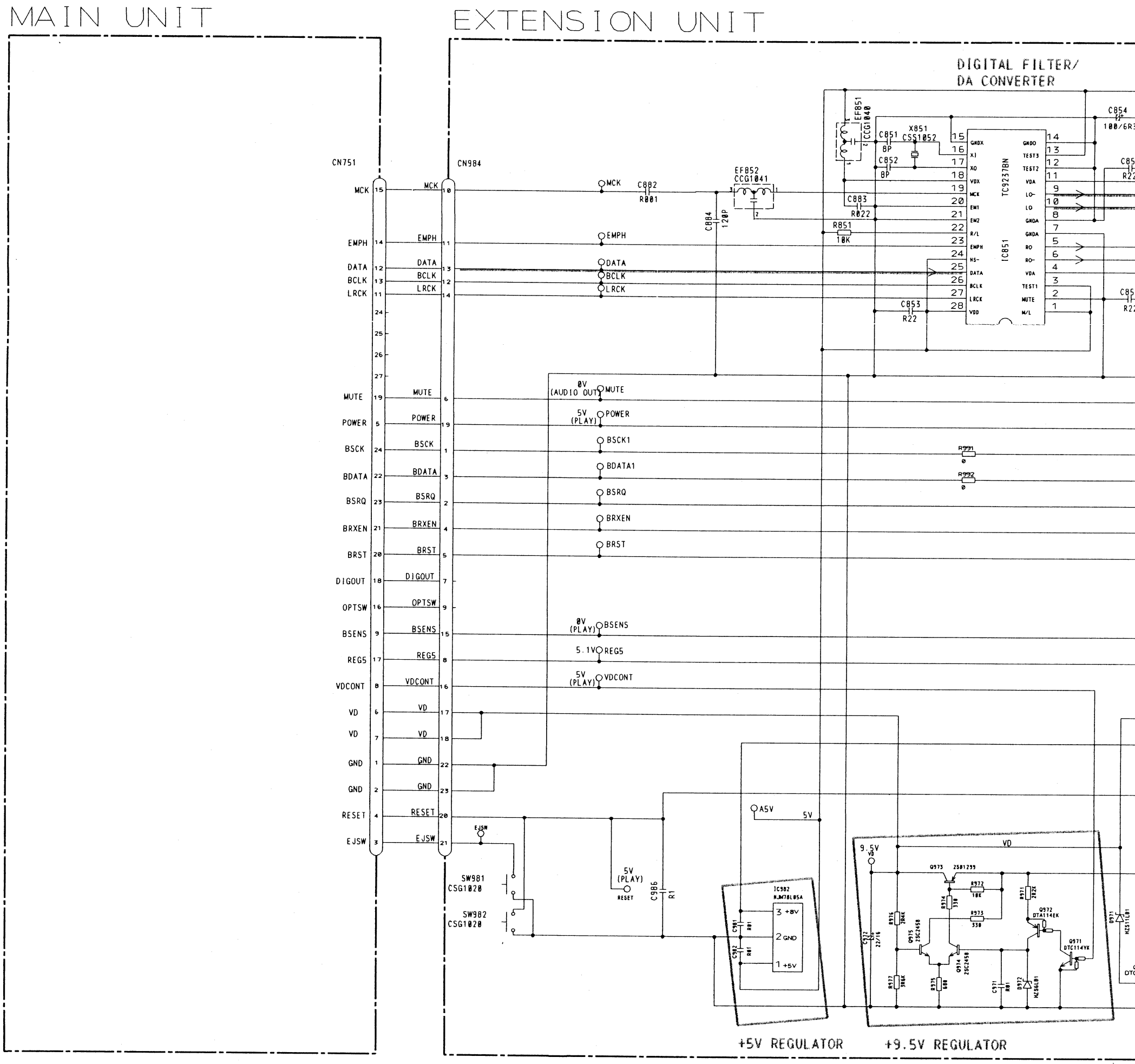
CN751

EXTENSION P.C. BOARD

Fig. 12

Proiees

## 7. SCHEMATIC CIRCUIT DIAGRAM(2)

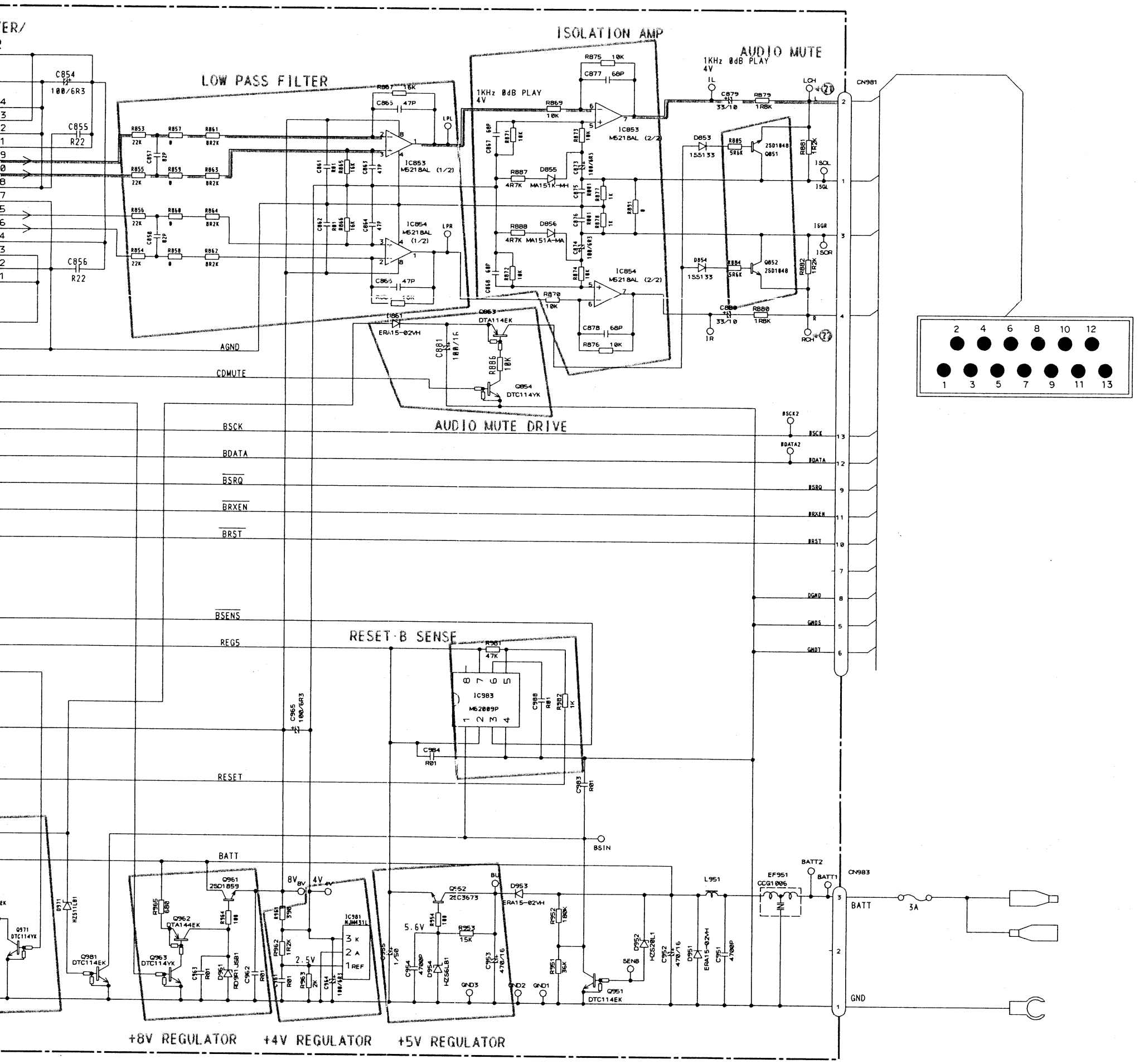



NOTE:

⊣▭⊢ Symbol indicates a resistor.
No differentiation is made between chip resistors and discrete resistors.

⊣⊢ Symbol indicates a capacitor.
No differentiation is made between chip capacitors and discrete capacitors.

Decimal
and capa
are expr
2.2→2R
0.022→

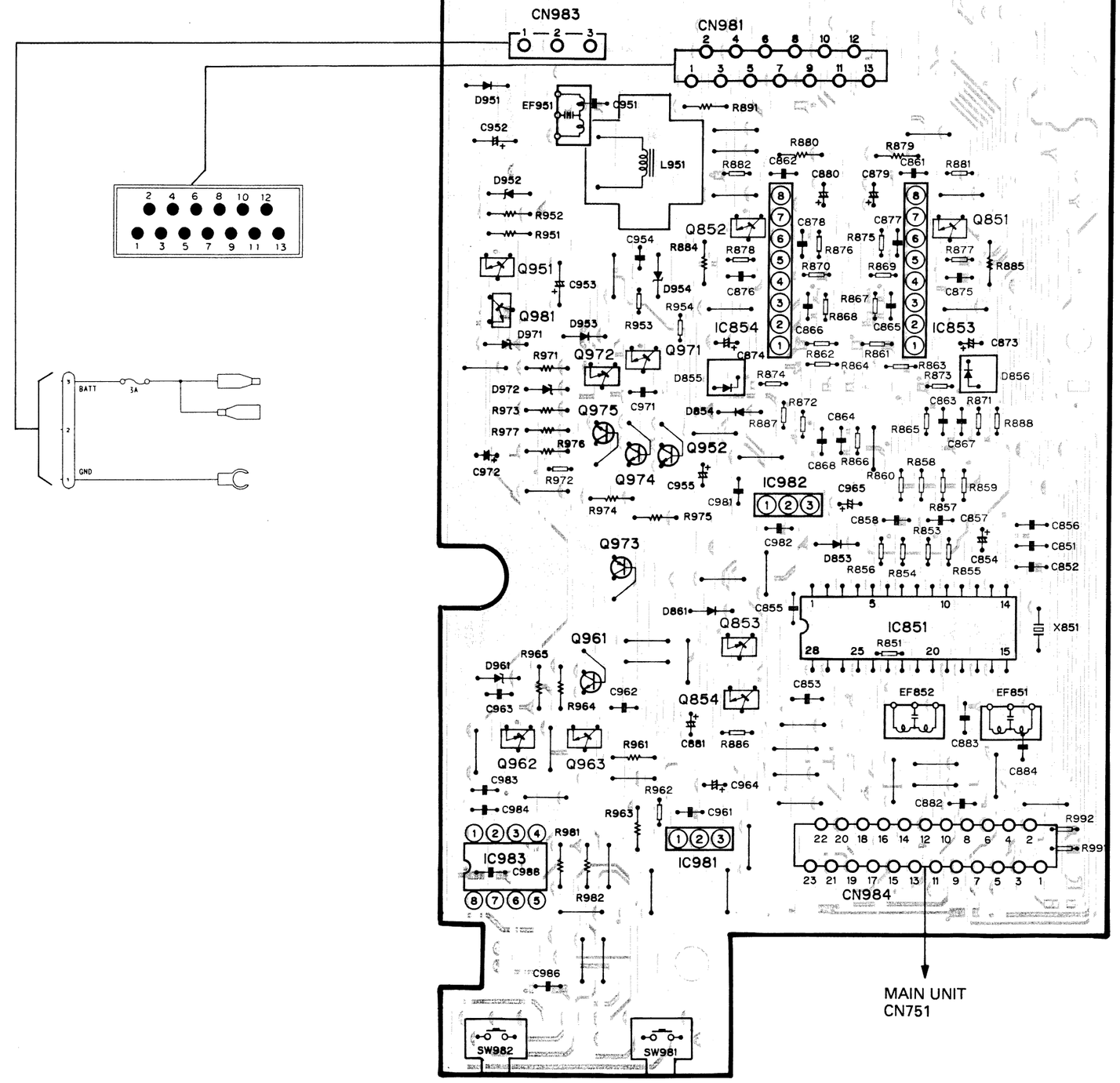



Decimal points for resistor and capacitor fixed values are expressed as:
2.2→2R2
0.022→R022

Fig. 13

## 8. CONNECTION DIAGRAM(2)

EXTENSION P.C. BOARD




IC, Q

Q852 Q851
Q951
Q981
IC854 IC853
Q971
Q972
Q975
Q974 Q952
IC982
Q973
IC851
Q853
Q961
Q854
Q962 Q963
IC981
IC983

Fig. 14

## 9. CHASSIS EXPLODED VIEW

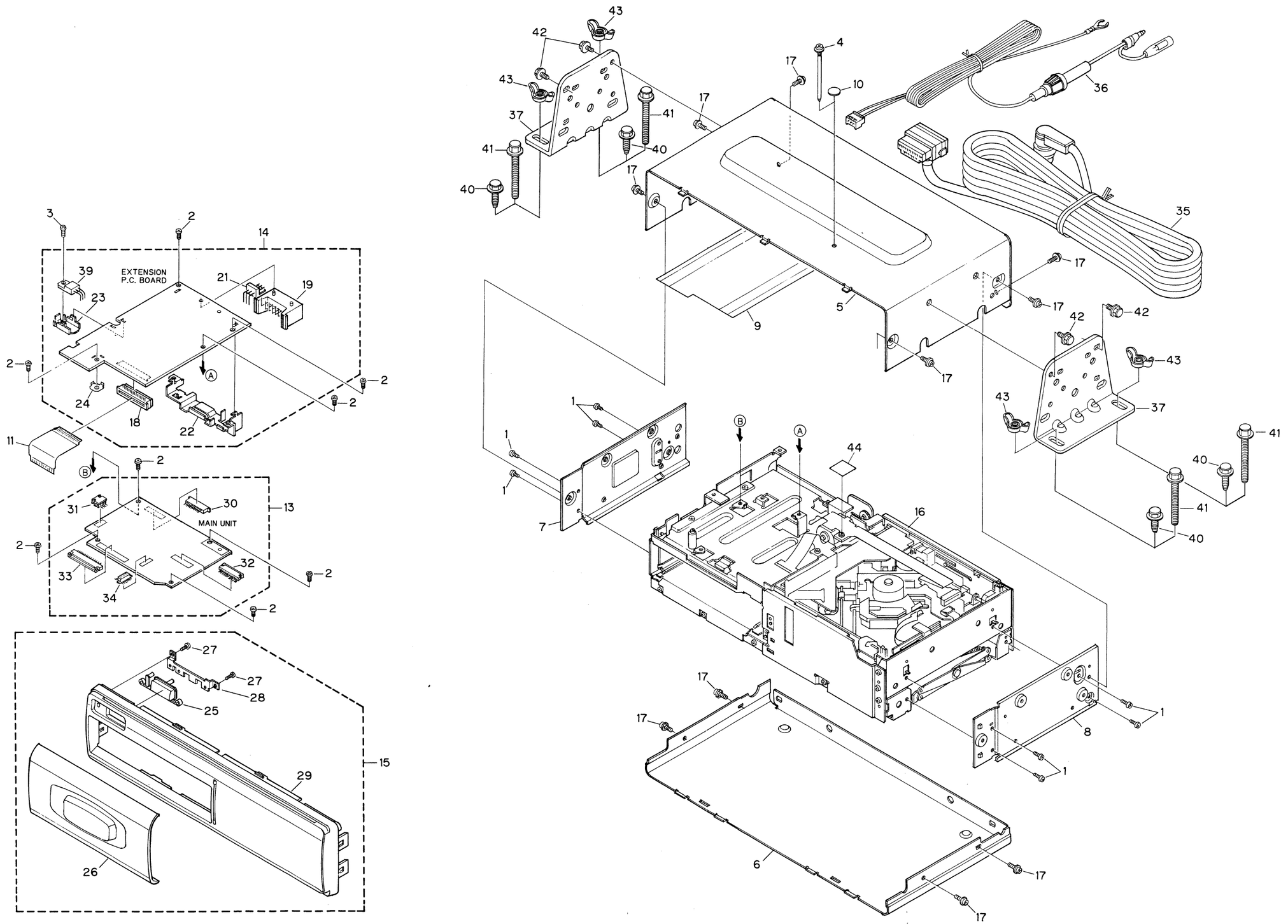



Fig. 15

NOTES:
●Parts marked by "*"are generally unavailable because they are not in our Master Spare Parts List.
●Parts marked by "⦿"are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

● Parts List

| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 1 | Screw | BMZ26P030FMC |
| | 2 | Screw | PMS26P040FMC |
| | 3 | Screw(M2.6x8) | CBA1186 |
| | 4 | Pin | CLA2163 |
| | 5 | Upper Case | CNB1653 |
| | 6 | Lower Case | CNB1654 |
| | 7 | Bracket L | CNC4444 |
| | 8 | Bracket R | CNC4445 |
| * | 9 | Insulator | CNM3628 |
| * | 10 | Seal | CNM3648 |
| | 11 | P.C.Board | CNP3138 |
| | 12 | ••••• | |
| ⦿ | 13 | Main Unit | CWX1512 |
| ⦿ | 14 | Extension Unit | CWX1566 |
| | 15 | Grille Assy(UC) | CXA6006 |
| | | Grille Assy(EW) | CXA5519 |
| ⦿ | 16 | CD Mechanism Unit | CXK2750 |
| | 17 | Screw | PMS30P040FZK |
| | 18 | Connector(23P)(CN984) | CKS1543 |
| | 19 | Connector(13P)(CN981) | CKS2101 |
| | 20 | ••••• | |
| | 21 | Plug(3P)(CN983) | CKS2372 |
| | 22 | Connector Bracket | CNC4446 |
| * | 23 | Heat Sink | CNC4447 |
| * | 24 | Earth Plate | CNC4650 |
| | 25 | Button | CAC3356 |
| | 26 | Door | CAT1493 |
| | 27 | Screw(M2.6x8) | CBA1161 |
| | 28 | Holder | CNC5043 |
| | 29 | Grille | CNS2550 |
| | 30 | Connector(15P)(CN804) | CKS1954 |
| | 31 | Connector(5P)(CN801) | CKS1943 |
| | 32 | Connector(17P)(CN351) | CKS1955 |
| | 33 | Connector(27P)(CN751) | CKS1965 |
| | 34 | Connector(16P)(CN901) | CKS2495 |
| | 35 | DIN Cord | CDE4125 |
| | 36 | Cord(UC) | CDE3741 |
| | | Cord(EW) | CDE3742 |
| | 37 | Angle | CNB1765 |
| | 38 | ••••• | |
| | 39 | Transistor(Q973) | 2SB1299 |
| | 40 | Screw | CBA1069 |
| | 41 | Screw | HMB60P500FZK |
| | 42 | Screw | HMF40P080FZK |
| | 43 | Nut | NR60FZK |
| | 44 | Insulator | CNM3779 |



# 10. MAGAZINE ASSY (CXA5483) EXPLODED VIEW

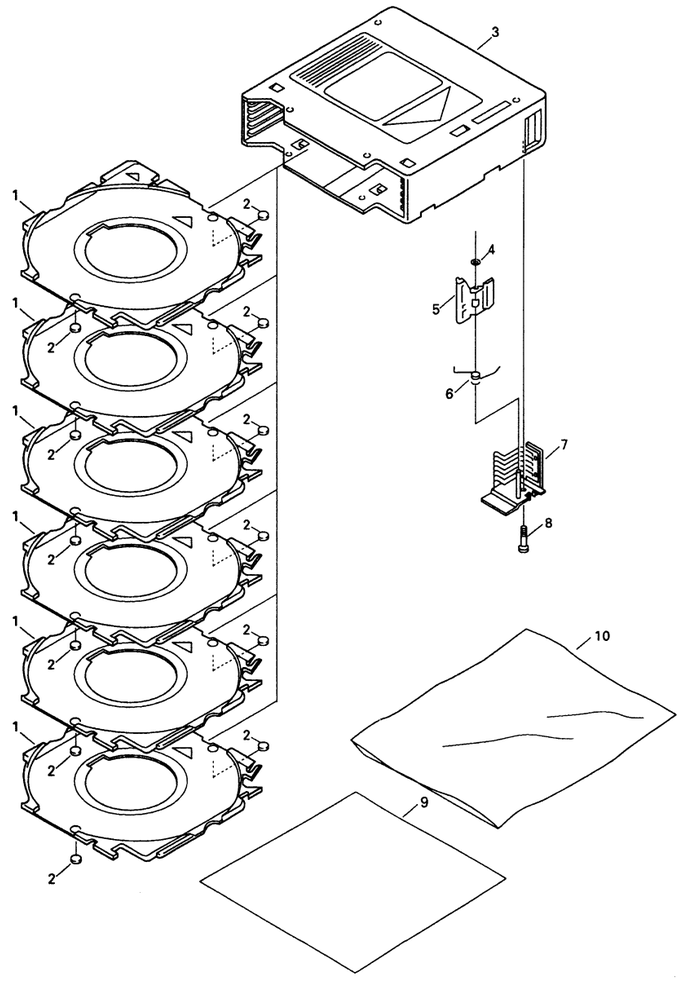



Fig.16

● Parts List

* Non Spare Part

| Mark | No. | Description | Part No. |
|---|---|---|---|
| * | 1 | Tray | CNV3469 |
| * | 2 | Cushion | CNM3622 |
| * | 3 | Case Unit | CXA5479 |
| | 4 | Washer | CBF1039 |
| * | 5 | Arm | CNV3468 |
| * | 6 | Spring | CBH1522 |
| * | 7 | Bracket Unit | CXA5481 |
| | 8 | Screw (M2x13) | CBA1272 |
| * | 9-1 | Owner's Manual | CRD1639 |
| * | 9-2 | Label | CRW1248 |
| | 10 | Polyethylene Bag | E36-618 |

ay be

FZK
FZK

## 10. MAGAZINE ASSY (CXA5483) EXPLODED VIEW

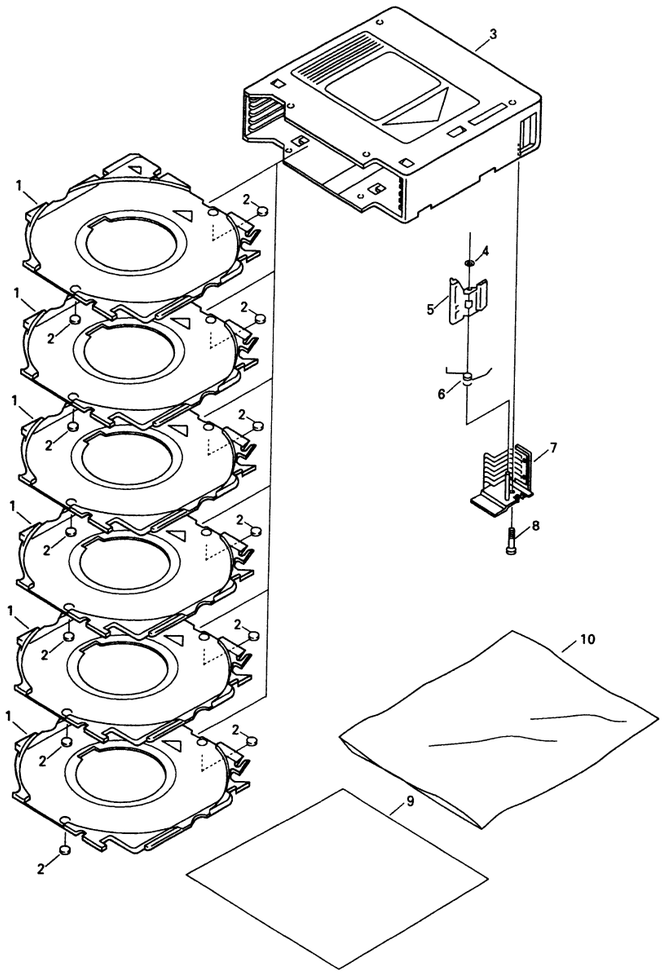



Fig.16

● Parts List

* Non Spare Part

| Mark | No. | Description | Part No. |
|---|---|---|---|
| * | 1 | Tray | CNV3469 |
| * | 2 | Cushion | CNM3622 |
| * | 3 | Case Unit | CXA5479 |
| | 4 | Washer | CBF1039 |
| * | 5 | Arm | CNV3468 |
| * | 6 | Spring | CBH1522 |
| * | 7 | Bracket Unit | CXA5481 |
| | 8 | Screw (M2x13) | CBA1272 |
| * | 9-1 | Owner's Manual | CRD1639 |
| * | 9-2 | Label | CRW1248 |
| | 10 | Polyethylene Bag | E36-618 |

# 11. CD MECHANISM UNIT EXPLODED VIEW

● Parts List

| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 1 | Screw | BMZ20P025FMC |
| | 2 | Screw | BMZ20P030FMC |
| | 3 | ••••• | |
| | 4 | Screw | BMZ26P030FMC |
| | 5 | Screw | BMZ26P050FMC |
| | 6 | LED (D1,2) | BR4361F |
| | 7 | Screw (M2x4) | CBA1015 |
| | 8 | Screw (M2x2.5) | CBA1037 |
| | 9 | Screw (M2x7) | CBA1060 |
| | 10 | Screw (M2x3) | CBA1062 |
| | 11 | Screw (M1.7x5.5) | CBA1070 |
| | 12 | Screw (M2x3) | CBA1077 |
| | 13 | ••••• | |
| | 14 | Screw (M2x6) | CBA1229 |
| | 15 | Screw (M2x2.5) | CBA1251 |
| | 16 | Washer | CBF1037 |
| | 17 | Washer | CBF1038 |
| | 18 | Spring | CBH1430 |
| | 19 | Spring | CBH1488 |
| | 20 | Spring | CBH1489 |
| | 21 | Spring | CBH1490 |
| | 22 | Spring | CBH1491 |
| | 23 | Spring | CBH1492 |
| | 24 | Spring | CBH1493 |
| | 25 | Spring | CBH1494 |
| | 26 | Spring | CBH1495 |
| | 27 | Spring | CBH1497 |
| | 28 | Spring | CBH1498 |
| | 29 | Spring | CBH1499 |
| | 30 | Spring | CBH1500 |
| | 31 | Spring | CBH1501 |
| | 32 | Spring | CBH1507 |
| | 33 | Spring | CBH1504 |
| | 34 | Spring | CBH1505 |
| | 35 | Spring | CBH1506 |
| | 36 | Spring | CBH1537 |
| | 37 | Spring | CBH1538 |
| | 38 | Spring | CBH1563 |
| | 39 | Spring | CBH1569 |
| | 40 | Spring | CBL1138 |
| | 41 | Spring | CBL1181 |
| | 42 | Spring | CBL1156 |
| | 43 | Spring | CBL1157 |
| | 44 | Spring | CBL1158 |
| | 45 | Connector(5P) | CDE3905 |
| | 46 | PU Unit | CGY1027 |
| | 47 | Connector (6P) | CKS1944 |
| | 48 | Connector (15P) | CKS1953 |
| | 49 | Connector (17P) | CKS1955 |
| | 50 | Connector (5P) | CKS2208 |
| | 51 | Shaft | CLA2027 |
| | 52 | Shaft | CLA2123 |
| | 53 | Shaft | CLA2126 |
| | 54 | Roller | CLA2127 |
| | 55 | Roller | CLA2159 |
| | 56 | Shaft | CLA2160 |
| | 57 | Collar | CLA2161 |
| | 58 | Shaft | CLA2210 |
| | 59 | Shaft | CLA2213 |
| | 60 | Shaft | CLA2239 |
| | 61 | Holder | CNC4073 |
| | 62 | Weight | CNC4551 |
| | 63 | Bracket | CNC4602 |
| | 64 | Arm | CNC4606 |
| | 65 | Holder | CNC4626 |
| | 66 | Side Frame (L) | CNC4649 |
| | 67 | R Frame | CNC4646 |
| | 68 | Scale | CNC4647 |
| | 69 | Bracket | CNC4630 |
| | 70 | CM Bracket | CNC4631 |
| | 71 | Bracket | CNC4632 |
| | 72 | Arm | CNC4634 |
| | 73 | Arm | CNC4635 |
| | 74 | Arm | CNC4636 |
| | 75 | TG Plate | CNC4637 |
| | 76 | Bracket | CNC4642 |
| | 77 | Frame | CNC4851 |
| | 78 | Frame | CNC4854 |
| | 79 | Cover | CNC4955 |
| | 80 | Frame | CNC4967 |
| | 81 | Spacer | CNM1787 |
| | 82 | Sheet | CNM3567 |
| | 83 | ••••• | |
| | 84 | P.C.Board | CNP3223 |
| | 85 | P.C.Board | CNP3225 |
| | 86 | P.C.Board | CNP3226 |
| | 87 | Ball | CNR1189 |
| | 88 | Gear | CNR1289 |
| | 89 | Gear | CNR1290 |
| | 90 | Gear | CNR1304 |
| | 91 | Guide | CNR1309 |
| | 92 | Holder | CNR1310 |
| | 93 | Holder | CNR1311 |
| | 94 | Belt | CNT1047 |
| | 95 | Holder | CNV3622 |
| | 96 | Arm | CNV3354 |
| | 97 | Lock | CNV3355 |
| | 98 | Screw Bearing | CNV3356 |
| | 99 | Holder | CNV3357 |
| | 100 | Roller | CNV3358 |
| | 101 | Cam | CNV3359 |
| | 102 | Guide | CNV3360 |
| | 103 | Guide | CNV3361 |
| | 104 | Holder | CNV3362 |
| | 105 | Holder | CNV3363 |
| | 106 | ••••• | |
| | 107 | Gear | CNV3366 |
| | 108 | Gear | CNV3367 |
| | 109 | Gear | CNV3368 |
| | 110 | Gear | CNV3371 |
| | 111 | TRYD Gear | CNV3372 |
| | 112 | CUPM Gear | CNV3373 |
| | 113 | Clamper UP Gear | CNV3374 |
| | 114 | Guide | CNV3375 |
| | 115 | Guide | CNV3376 |
| | 116 | Arm | CNV3377 |
| | 117 | Arm | CNV3378 |
| | 118 | Guide | CNV3379 |
| | 119 | Guide | CNV3380 |
| | 120 | ••••• | |
| | 121 | Gear | CNV3382 |
| | 122 | Gear | CNV3383 |
| | 123 | Gear | CNV3384 |
| | 124 | Guide | CNV3385 |
| | 125 | Arm | CNV3386 |
| | 126 | Roller | CNV3387 |
| | 127 | Wheel | CNV3526 |
| | 128 | Arm | CNV3546 |
| | 129 | Cover | CNV3547 |
| | 130 | Holder | CNV3548 |
| | 131 | Damper | CNV3353 |
| | 132 | Holder | CNV3584 |
| | 133 | Plate | CNV3629 |
| | 134 | P.C.Board | CNP3227 |
| | 135 | P.C.Board | CNP3393 |
| | 136 | P.C.Board | CNP3540 |
| | 137 | P.C.Board | CNP3217 |
| | 138 | P.C.Board | CNP3218 |
| | 139 | P.C.Board | CNP3219 |
| | 140 | P.C.Board | CNP3220 |
| | 141 | P.C.Board | CNP3221 |
| | 142 | Switch (S801,802,803,804,805) | CSN1012 |
| | 143 | Motor Unit (Spindle) (M1) | CXA4540 |
| | 144 | Motor Unit (Carriage) (M4) | CXA4649 |
| | 145 | Stage Chassis Unit | CXA5287 |
| | 146 | ••••• | |
| | 147 | Mode Ring Unit | CXA5288 |
| | 148 | Steer R Unit | CXA5289 |
| | 149 | LM Bracket Unit | CXA5290 |
| | 150 | Rink Unit | CXA5291 |
| | 151 | Lever Unit | CXA5292 |
| | 152 | Arm Unit | CXA5293 |
| | 153 | Gear Arm Unit | CXA5294 |
| | 154 | Arm Unit | CXA5295 |
| | 155 | Plate Unit | CXA5296 |
| | 156 | TG Bracket Unit | CXA5297 |
| | 157 | CRG Chassis Unit | CXA5298 |
| | 158 | Bracket Unit | CXA5299 |
| | 159 | Arm Unit | CXA5300 |
| | 160 | Arm Unit | CXA5301 |
| | 161 | Screw | |
| | 162 | Arm U | |
| | 163 | Bracke | |
| | 164 | Bracke | |
| | 165 | Holde | |
| | 166 | Frame | |
| | 167 | Arm U | |
| | 168 | Arm U | |
| | 169 | Bracke | |
| | 170 | Arm U | |
| | 171 | Main | |
| | 172 | Lever | |
| | 173 | Maga | |
| | 174 | Upper | |
| | 175 | Brack | |
| | 176 | Motor | |
| | 177 | Gear | |
| * | 178 | Motor | |
| | 179 | Motor | |
| | 180 | Gear | |
| * | 181 | Motor | |
| | 182 | Whor | |
| | 183 | Arm U | |
| | 184 | Damp | |
| | 185 | Clamp | |

| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 81 | Spacer | CNM1787 |
| | 82 | Sheet | CNM3567 |
| | 83 | ••••• | |
| | 84 | P.C.Board | CNP3223 |
| | 85 | P.C.Board | CNP3225 |
| | 86 | P.C.Board | CNP3226 |
| | 87 | Ball | CNR1189 |
| | 88 | Gear | CNR1289 |
| | 89 | Gear | CNR1290 |
| | 90 | Gear | CNR1304 |
| | 91 | Guide | CNR1309 |
| | 92 | Holder | CNR1310 |
| | 93 | Holder | CNR1311 |
| | 94 | Belt | CNT1047 |
| | 95 | Holder | CNV3622 |
| | 96 | Arm | CNV3354 |
| | 97 | Lock | CNV3355 |
| | 98 | Screw Bearing | CNV3356 |
| | 99 | Holder | CNV3357 |
| | 100 | Roller | CNV3358 |
| | 101 | Cam | CNV3359 |
| | 102 | Guide | CNV3360 |
| | 103 | Guide | CNV3361 |
| | 104 | Holder | CNV3362 |
| | 105 | Holder | CNV3363 |
| | 106 | ••••• | |
| | 107 | Gear | CNV3366 |
| | 108 | Gear | CNV3367 |
| | 109 | Gear | CNV3368 |
| | 110 | Gear | CNV3371 |
| | 111 | TRYD Gear | CNV3372 |
| | 112 | CUPM Gear | CNV3373 |
| | 113 | Clamper UP Gear | CNV3374 |
| | 114 | Guide | CNV3375 |
| | 115 | Guide | CNV3376 |
| | 116 | Arm | CNV3377 |
| | 117 | Arm | CNV3378 |
| | 118 | Guide | CNV3379 |
| | 119 | Guide | CNV3380 |
| | 120 | ••••• | |

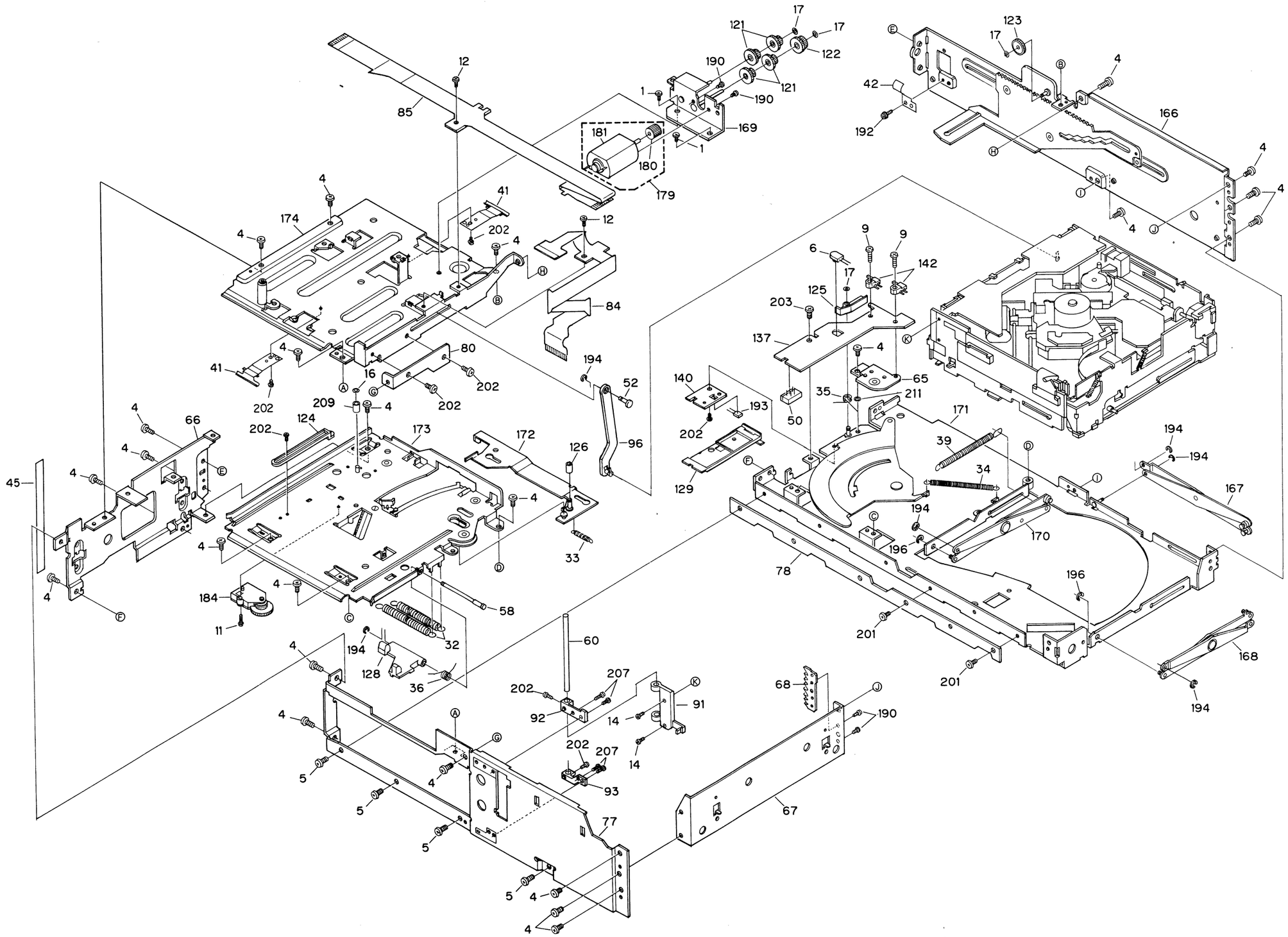
| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 121 | Gear | CNV3382 |
| | 122 | Gear | CNV3383 |
| | 123 | Gear | CNV3384 |
| | 124 | Guide | CNV3385 |
| | 125 | Arm | CNV3386 |
| | 126 | Roller | CNV3387 |
| | 127 | Wheel | CNV3526 |
| | 128 | Arm | CNV3546 |
| | 129 | Cover | CNV3547 |
| | 130 | Holder | CNV3548 |
| | 131 | Damper | CNV3353 |
| | 132 | Holder | CNV3584 |
| | 133 | Plate | CNV3629 |
| | 134 | P.C.Board | CNP3227 |
| | 135 | P.C.Board | CNP3393 |
| | 136 | P.C.Board | CNP3540 |
| | 137 | P.C.Board | CNP3217 |
| | 138 | P.C.Board | CNP3218 |
| | 139 | P.C.Board | CNP3219 |
| | 140 | P.C.Board | CNP3220 |
| | 141 | P.C.Board | CNP3221 |
| | 142 | Switch (S801,802,803,804,805) | CSN1012 |
| | 143 | Motor Unit (Spindle) (M1) | CXA4540 |
| | 144 | Motor Unit (Carriage) (M4) | CXA4649 |
| | 145 | Stage Chassis Unit | CXA5287 |
| | 146 | ••••• | |
| | 147 | Mode Ring Unit | CXA5288 |
| | 148 | Steer R Unit | CXA5289 |
| | 149 | LM Bracket Unit | CXA5290 |
| | 150 | Rink Unit | CXA5291 |
| | 151 | Lever Unit | CXA5292 |
| | 152 | Arm Unit | CXA5293 |
| | 153 | Gear Arm Unit | CXA5294 |
| | 154 | Arm Unit | CXA5295 |
| | 155 | Plate Unit | CXA5296 |
| | 156 | TG Bracket Unit | CXA5297 |
| | 157 | CRG Chassis Unit | CXA5298 |
| | 158 | Bracket Unit | CXA5299 |
| | 159 | Arm Unit | CXA5300 |
| | 160 | Arm Unit | CXA5301 |



| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 161 | Screw Unit | CXA5302 |
| | 162 | Arm Unit | CXA5303 |
| | 163 | Bracket Unit | CXA5304 |
| | 164 | Bracket Unit | CXA5305 |
| | 165 | Holder Unit | CXA5308 |
| | 166 | Frame Unit | CXA5320 |
| | 167 | Arm Unit | CXA5311 |
| | 168 | Arm Unit | CXA5313 |
| | 169 | Bracket Unit | CXA5314 |
| | 170 | Arm Unit | CXA5315 |
| | 171 | Main Frame Unit | CXA5316 |
| | 172 | Lever Unit | CXA5317 |
| | 173 | Magazine Holder Unit | CXA5321 |
| | 174 | Upper Frame Unit | CXA5319 |
| | 175 | Bracket Unit | CXA5322 |
| | 176 | Motor Unit (Loading) (M3) | CXA5324 |
| | 177 | Gear | CNV3365 |
| * | 178 | Motor | CXM1069 |
| | 179 | Motor Unit (Elevation) (M2) | CXA5325 |
| | 180 | Gear | CNV3381 |
| * | 181 | Motor | CXM1061 |
| | 182 | Whom Bracket Unit | CXA5326 |
| | 183 | Arm Unit | CXA5561 |
| | 184 | Damper Unit | CXA5631 |
| | 185 | Clamper | HEF-102 |

| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 186 | Screw | JFZ14P016FNI |
| | 187 | ••••• | |
| | 188 | ••••• | |
| | 189 | ••••• | |
| | 190 | Screw | JFZ20P025FNI |
| | 191 | Screw | JGZ20P070FNI |
| | 192 | Screw | PMS20P025FMC |
| | 193 | Photo Transistor (P801,802) | PT4800 |
| | 194 | Washer | YE15FUC |
| | 195 | Washer | YE20FUC |
| | 196 | Washer | YE25FUC |
| | 197 | Sheet | CNM3798 |
| | 198 | Bracket | CNC5028 |
| | 199 | Insulator | CNM3786 |
| | 200 | Sheet | CNM3817 |
| | 201 | Screw | BMZ26P040FMC |
| | 202 | Screw (M2x2.5) | CBA1041 |
| | 203 | Screw (M2.6x3) | CBA1065 |
| | 204 | ••••• | |
| | 205 | Screw | JFZ17P025FNI |
| | 206 | Screw | JFZ17P035FNI |
| | 207 | Screw | JFZ20P030FNI |
| | 208 | Sheet | CNM3826 |
| | 209 | Roller | CLA2266 |
| | 210 | Spring | CBH1579 |
| | 211 | Washer | CBE-112 |

**●CD Mechanism Unit**



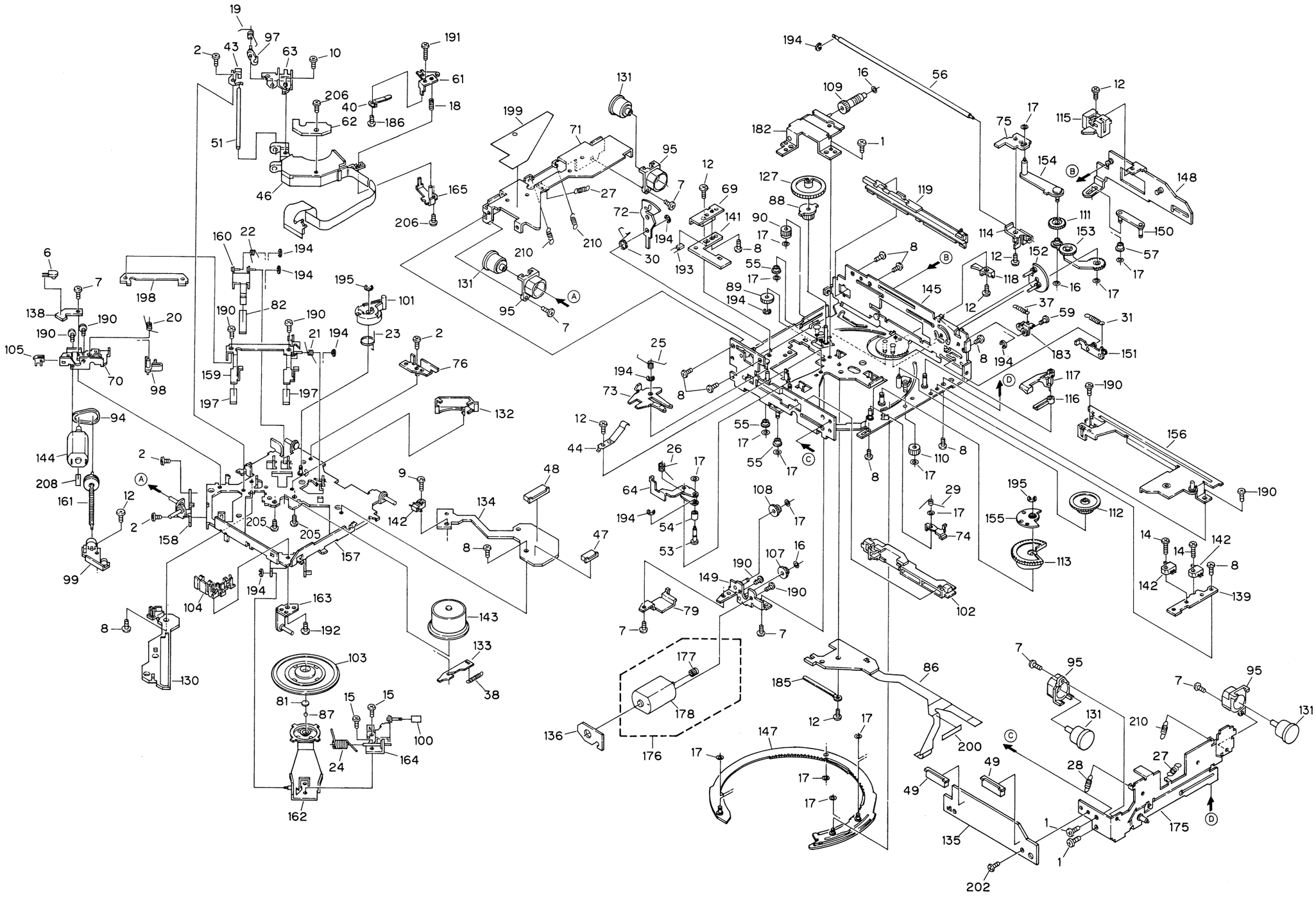

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Fig. 17

## 12. PACKING METHOD

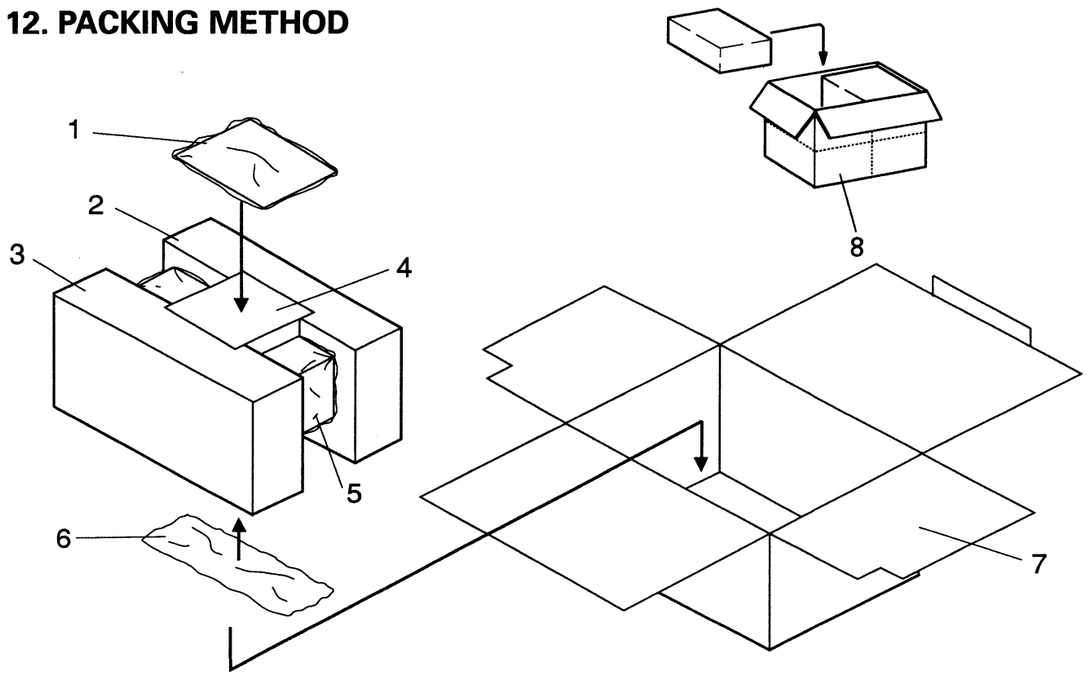



Fig.18

● Parts List

| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 1-1 | Owner's Manual(UC) | CRD1645 |
| | | Owner's Manual(EW) | CRD1643 |
| | | Owner's Manual(EW) | CRD1644 |
| * | 1-2 | Card | ARY1048 |
| * | | Card | CRY-062 |
| | 2 | Protector | CHP1539 |
| | 3 | Protector | CHP1538 |
| | 4 | Magazine Assy | CXA5483 |
| | 5 | Cover | CEG1082 |
| | | Caution Card | CRP1112 |
| * | | Seal | CNM3648 |
| | 6 | Accessory Assy(UC) | CEA1810 |
| | | Accessory Assy(EW) | CEA1790 |
| | 6-1 | DIN Cord | CDE4125 |
| | 6-2 | Cord(UC) | CDE3741 |
| | | Cord(EW) | CDE3742 |

* Non Spare Part

| Mark | No. | Description | Part No. |
|---|---|---|---|
| | 6-3 | Screw Assy | CEA1788 |
| | 6-3-1 | Screw(x4) | CBA1069 |
| * | 6-3-2 | Polyethylene Bag | E36-615 |
| | 6-3-3 | Screw(x4) | HMB60P500FZK |
| | 6-3-4 | Screw(x4) | HMF40P080FZK |
| | 6-3-5 | Nut(x4) | NR60FZK |
| | 6-4 | Angle(x2) | CNB1765 |
| * | 6-5 | Polyethylene Bag | E36-622 |
| | 7 | Carton(UC) | CHG2304 |
| | | Carton(EW) | CHG2303 |
| | 8 | Contain Box(UC) | CHL2304 |

1-1 Owner's Manual

| Part No. | Model | Language |
|---|---|---|
| CRD1645 | CDX-M6/UC | English,French |
| CRD1643 | CDX-M6/EW | English,Italian,French, German,Dutch |
| CRD1644 | CDX-M6/EW | Spanish,Portuguese, Swedish,Norwegian, Finnish |



## 13. ELECTRICAL PARTS LIST

**NOTE:**

● *Parts whose parts numbers are omitted are subject to being not supplied.*

● *The part numbers shown below indicate chip components.*

*Chip Resistor*

*RS1/○S○○○J,RS1/○○S○○○J*

*Chip Capacitor (except for CQS.....)*

*CKS....., CCS....., CSZS.....*

| Circuit Symbol & No. | Part Name | Part No. |
|---|---|---|
| Unit Number : | | |
| Unit Name : Main Unit | | |
| MISCELLANEOUS | | |
| IC 351 | | UPC1347GS |
| IC 601 | | UPD6374AGH |
| IC 602 652 | | NJM4558MD |
| IC 651 | | PA3026 |
| IC 661 | | TA78L05F |
| IC 701 | | UPD6375GC |
| IC 751 | | PD5230A |
| IC 752 | | LH5116HN-10T |
| IC 801 | | XRA6247FP |
| Q 351 | | 2SB1260 |
| Q 601 | | 2SB709A |
| Q 651 801 | | UN2211 |
| Q 652 | | 2SB1184F5 |
| Q 653 | | 2SB1184F5 |
| Q 705 781 | | UN2211 |
| Q 751 | | UN2111 |
| Q 802 | | 2SB1184F5 |
| D 651 652 | | SC016-2 |
| D 751 760 761 | | MA151A-MA |
| D 752 | | MA151WK-MT |
| D 754 755 756 757 758 | | MA153-MC |
| X 751 | | CSS1084 |
| VR 351 352 355 | Semi-fixed 47kΩ(B) | CCP1023 |
| VR 353 356 | Semi-fixed 2.2kΩ(B) | CCP1015 |
| VR 354 | Semi-fixed 22kΩ(B) | CCP1021 |
| | Checker Chip | CKF1025 |
| RESISTORS | | |
| R 353 | | RS1/16S623J |
| R 354 753 760 781 795 797 | | RS1/16S473J |
| R 355 | | RS1/16S122J |
| R 356 357 658 | | RS1/16S683J |
| R 358 359 | | RS1/16S332J |
| R 360 | | RS1/16S684J |
| R 361 | | RS1/16S153J |
| R 369 605 607 610 666 775 903 | | RS1/16S103J |
| R 370 381 | | RS1/16S133J |
| R 375 377 609 613 651 663 671 672 | | RS1/16S102J |
| R 379 | | RS1/16S513J |
| R 380 754 761 772 777 782 784 788 796 798 | | RS1/16S104J |
| R 382 | | RS1/8S100J |
| R 383 | | RS1/8S120J |
| R 606 | | RS1/16S224J |
| R 611 791 | | RS1/16S102J |
| R 614 664 | | RS1/16S912J |
| R 615 616 810 | | RS1/16S472J |
| R 652 | | RS1/16S162J |
| R 653 | | RS1/16S222J |
| R 654 | | RS1/16S332J |
| R 655 | | RS1/16S362J |
| R 656 | | RS1/16S183J |
| R 660 662 665 811 812 813 | | RS1/10S131J |
| R 661 | | RS1/16S472J |
| R 669 | | RS1/16S183J |
| R 678 | | RS1/16S103J |
| R 679 | | RS1/16S333J |
| R 701 | | RS1/16S272J |
| R 702 703 704 802 803 804 915 | | RS1/16S102J |
| R 708 | | RS1/16S201J |
| R 709 751 789 821 822 919 920 921 923 | | RS1/16S0R0J |
| R 717 922 933 | | RS1/16S0R0J |
| R 752 | | RS1/16S223J |
| R 755 757 758 759 762 763 765 773 787 931 | | RS1/16S222J |
| R 756 770 771 779 780 | | RS1/16S681J |
| R 766 786 794 805 806 807 | | RS1/16S563J |
| R 790 | | RS1/16S563J |
| R 799 926 | | RS1/16S104J |
| R 825 826 835 836 | | RS1/10S241J |
| R 905 908 912 | | RS1/16S103J |
| R 911 | | RS1/16S433J |
| R 916 | | RS1/16S0R0J |
| R 918 | | RS1/16S154J |
| R 925 928 930 | | RS1/16S0R0J |
| R 932 | | RS1/16S222J |
| CAPACITORS | | |
| C 351 | | CEV470M6R3 |
| C 352 751 | | CKSQYB104K16 |
| C 353 | | CEV101M6R3 |
| C 354 355 609 610 | | CEV100M16 |
| C 357 359 366 | | CKSRYB102K50 |
| C 358 603 | | CKSRYB331K50 |
| C 360 | | CKSRYB271K50 |
| C 361 | | CCSRCH220J50 |
| C 373 | | CKSYB224K16 |
| C 601 | | CKSRYB222K50 |
| C 604 652 654 | | CKSYB224K16 |
| C 605 606 611 615 616 618 619 661 666 762 | | CKSRYB103K50 |
| C 608 | | CEV100M16 |
| C 614 | | CKSRYB821K50 |
| C 617 702 708 709 757 | | CKSRYB103K50 |
| C 655 | | CKSQYB333K25 |
| C 657 | | CKSRYB391K50 |
| C 658 | | CKSQYB272K50 |
| C 663 | | CKSQYB333K25 |
| C 665 | 400μF/10V | CCH1120 |
| C 667 | | CEV220M16 |
| C 752 764 765 | | CCSRCH221J50 |
| C 756 | | CKSRYB472K50 |
| C 763 | | CKSRYB103K50 |
| C 801 | | CEV220M16 |

| Circuit Symbol & No. | Part Name | Part No. |
|---|---|---|
| C 802 | | CKSQYB223K25 |
| C 803 | | CKSQYB223K25 |
| Unit Number : | | |
| Unit Name : Extension P.C.Board | | |
| MISCELLANEOUS | | |
| IC 851 | | TC9237BN |
| IC 853 854 | | M5218AL |
| IC 981 | | NJM431L |
| IC 982 | | NJM78L05A |
| IC 983 | | M62009P |
| Q 851 852 | | 2SD1048 |
| Q 853 | | DTA114EK |
| Q 854 963 971 | | DTC114YK |
| Q 951 | | DTC114EK |
| Q 952 | | 2SC3673 |
| Q 961 | | 2SD1859 |
| Q 962 | | DTA144EK |
| Q 972 | | DTA114EK |
| Q 973 | | 2SB1299 |
| Q 974 975 | | 2SC2458 |
| Q 981 | | DTC114EK |
| D 853 854 | | 1SS133 |
| D 855 | | MA151K-MH |
| D 856 | | MA151A-MA |
| D 861 951 953 | | ERA15-02VH |
| D 952 | | HZS20L1 |
| D 954 972 | | HZS6LB1 |
| D 961 | | RD9R1JSB1 |
| D 971 | | HZS11LB1 |
| L 951 | Choke Coil | CTH1047 |
| X 851 | Crystal Resonator | CSS1052 |
| SW 981 982 | Switch (EJECT,RESET) | CSG1020 |
| EF 851 | EMI Filter | CCG1040 |
| EF 852 | EMI Filter | CCG1041 |
| EF 951 | EMI Filter | CCG1006 |
| RESISTORS | | |
| R 851 972 | | RS1/10S103J |
| R 853 854 855 856 | | RS1/10S223J |
| R 857 858 859 860 | | RS1/8S0R0J |
| R 861 862 863 864 | | RS1/8S822J |
| R 865 866 | | RS1/10S163J |
| R 867 868 | | RS1/10S163J |
| R 869 870 871 872 873 874 875 876 | | RN1/10SE103D |
| R 877 878 | | RS1/10S102J |
| R 879 880 | | RD1/4PS182JL |
| R 881 882 | | RS1/10S122J |
| R 884 885 | | RD1/4PS562JL |
| R 886 | | RS1/8S103J |
| R 887 888 | | RS1/10S472J |
| R 891 | | RD1/4PS0R0JL |
| R 951 | | RD1/4PS363JL |
| R 952 | | RD1/4PS184JL |
| R 953 | | RS1/10S153J |
| R 954 | | RS1/10S101J |
| R 961 | | RD1/4PS391JL |
| R 962 | | RS1/10S122J |
| R 963 | | RD1/4PS202JL |
| R 964 | | RD1/4PS101JL |
| R 965 975 | | RD1/4PS681JL |
| R 971 | | RD1/4PS222JL |
| R 973 974 | | RD1/4PS331JL |

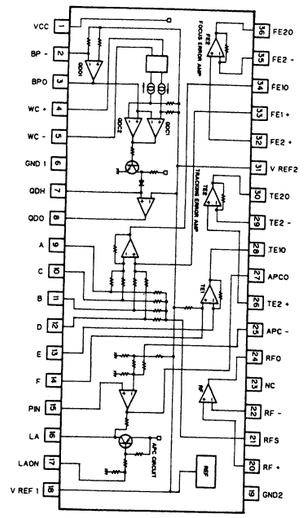
| Circuit Symbol & No. | Part Name | Part No. |
|---|---|---|
| R 976 | | RD1/4PS242JL |
| R 977 | | RD1/4PS362JL |
| R 981 | | RD1/4PS473JL |
| R 982 | | RD1/4PS102JL |
| R 991 992 | | RS1/10S0R0J |
| CAPACITORS | | |
| C 851 852 | | CCSCH080D50 |
| C 853 855 856 | | CKSYB224K25 |
| C 854 | | CEA101M6R3LS |
| C 857 858 | | CCSQCH820J50 |
| C 861 862 961 962 963 971 981 982 983 984 | | CKSQYB103K25 |
| C 863 864 | | CCSQCH470J50 |
| C 865 866 | | CCSQCH470J50 |
| C 867 868 | | CCSQCH680J50 |
| C 873 874 | | CEA101M6R3LL |
| C 875 876 882 | | CCSQSL102J50 |
| C 877 878 | | CCSQCH680J50 |
| C 879 880 | | CEA330M10LL |
| C 881 | | CEA101M16LL |
| C 883 | | CKSQYB223K50 |
| C 884 | | CCSQCH121J50 |
| C 951 954 | | CKSQYB472K50 |
| C 952 953 | | CEAS471M16 |
| C 955 | | CEA010M50LS |
| C 964 965 | | CEA101M6R3LL |
| C 972 | | CEA220M16LL |
| C 986 | | CKSQYB104K25 |
| C 988 | | CKSYB103K25 |
| Unit Number : | | |
| Unit Name: Mechanism P.C.Board | | |
| S 805 | Switch | CSN1012 |
| Unit Number : | | |
| Unit Name: Photo P.C.Board | | |
| D 1 | LED | BR4361F |
| S 801 802 | Switch | CSN1012 |
| Miscellaneous Parts List | | |
| D 2 | LED | BR4361F |
| S 803 804 | Switch | CSN1012 |
| P 801 802 | Photo Transistor | PT4800 |
| M 1 | Motor Unit (Spindle) | CXA4540 |
| M 2 | Motor Unit (Elevation) | CXA5325 |
| M 3 | Motor Unit (Loading) | CXA5324 |
| M 4 | Motor Unit (Carriage) | CXA4649 |
| | PU Unit | CGY1027 |



# 14. CIRCUIT DESCRIPTION

## 1. Preamplifier Stage

This unit processes a pickup output signal to make signals for subsequent stages, i.e. servo unit, modulator unit and control unit. The signal from the pickup is converted on an I-V basis in a photodetector-builtin preamplifier inside the pickup.
Besides, an addition is made to the signal in an RF amplifier (IC351) to obtain RF, FE and TE signals.
The preamplifier unit has a configuration with one-chip IC UPD1347GS mainly employed. It is described in detail below.
The present system, which is of single power (+5 V) type, has 2.5 volts available for both RF Amplifier Reference Voltage Vref and other signal circuit reference voltage REFOUT. Voltages referred to below are to be expressed in Unit [REFOUT]. (A voltage based on a reference value of 0 (V) is to be expressed in Unit [V] . )
The IC is a 36-pin flat package, which has an internal configuration as shown in Fig. 19.
This IC is described below concerning its internal component parts.
(NOTE) Pin ⑲ on IC351 has Vref (2.5 V), which in turn serves as the reference voltage in the RF amplifier. For measurements, adjustments, etc., apply REFOUT obtained by passing REFO of Pin ⑲ on IC601 through a buffer.




Block diagram

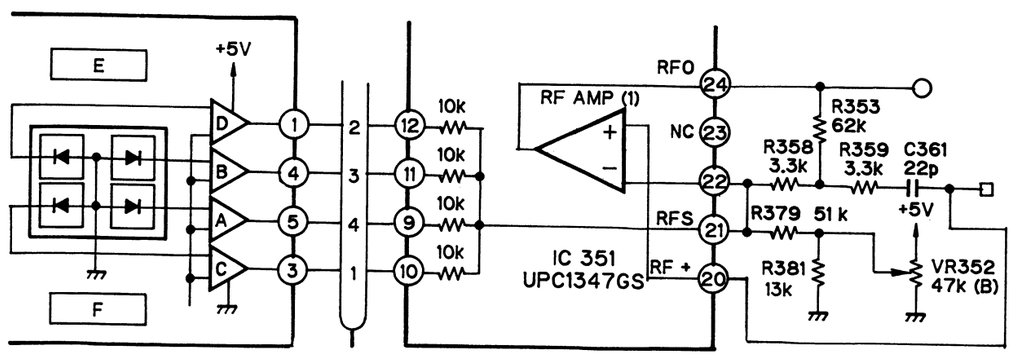
Fig. 19

### (1) RF amplifier

Photodetector Outputs A, B, C and D are added in amplifier (1) so that (A + B + C + D) will be outputted to RFO. (This terminal permits an eye pattern to be checked.) RFO output voltage VRFO has lowfrequency components as follows:

$$VRFO\ [REFOUT] = -[(R358 + R353)/10\ k] \times (A + B + C + D)$$

For RFO output (Pin ㉔, an RF output at a level of VRFO = 1.9 Vp-p', AC., is available, with REFOUT at the center.




Block diagram

Fig. 20

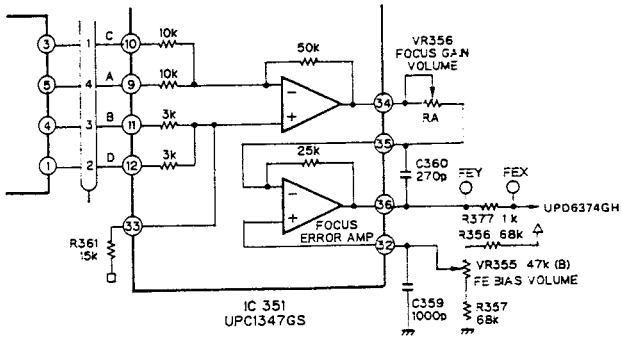
### (2) Focus error amplifier

Photodetector outputs A, B, C and D are inputted to both differential and focus-error amplifiers so that A + C − B − D will be outputted.

An FE output volatage (low frequency) will be :

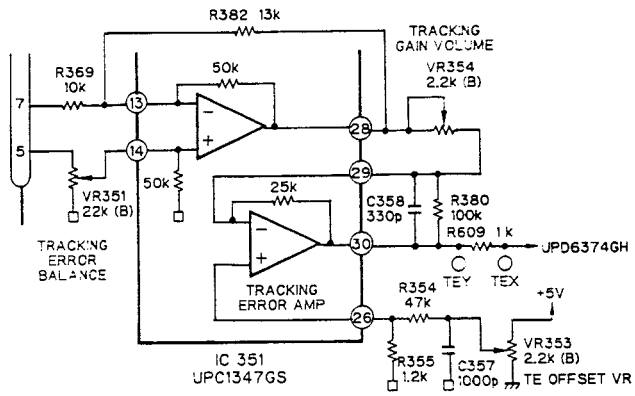
$V_{FE} = 5 \times 25\ k/R_A \times (A + C - B - D)$[REFOUT]

An FE output (Pin ㊱) of about 2.5 (V) is available as an S-shaped curve.




Focus error amplifier Fig. 21

### (3) Tracking error amplifier




Tracking error amplifier Fig. 22

The side-spot voltages inputted to E and F are amplified in differential and tracking-error amplifiers so that an output (E-F) can be obtained.

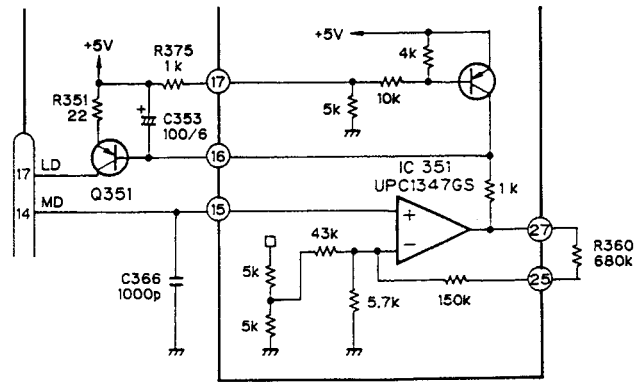
$V_{TE} =$

$50\ k//13\ k\ /10\ k \times 100\ k//25\ k\ /R_B \times (E\text{-}F)$ [REFOUT]

The TE offset VR, moreover, is to cancel a DC offset from the preamplifier to the servo amplifier while the TE balance VR is to adjust the tracking signal symmetry. These are the prerequisites to mainly perform an operation of tracking normally. A tracking error of approximately 2 (v) p-p' is available as an output of pin ㉚.

### (4) APC circuit

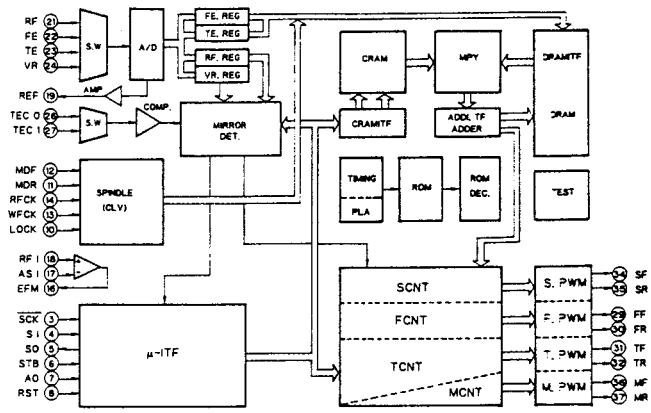
A laser diode, if driven at a constant current, will have a negative temperature curve with a large optical output. It is necessary, therefore, to control the current with a monitor photodiode so that a constant output will be available. This is an APC circuit. The present system has LDI set to approximately 50 thru 60 mA.




APC circuit Fig. 23

## 2. Servo Stage

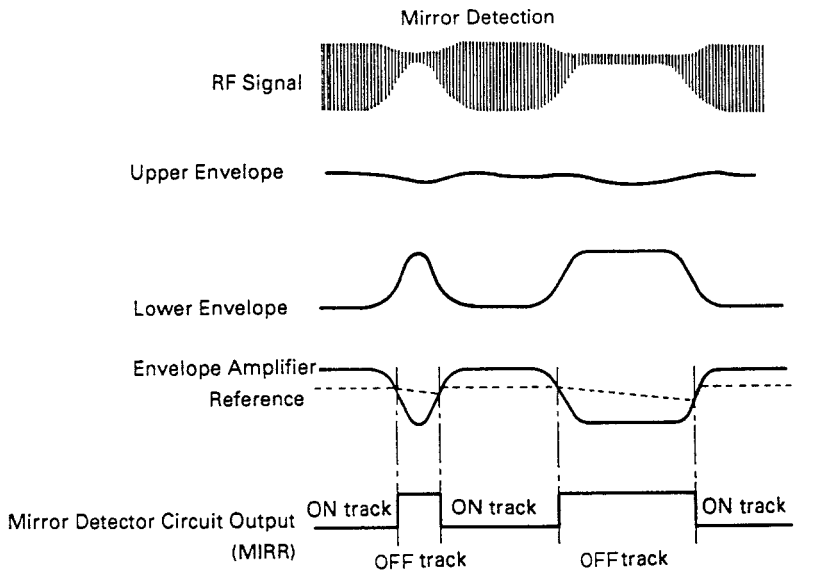
This unit has FE, TE and RF outputs received as its inputs from the RF amplifier. And the analog signals are converted to the digital ones, which are in turn used to execute the servo operations of focus tracking, carriage and spindle and the servo control of in-focus track jump, etc. subject to an instruction from the system microcomputer. IC UPD6374AGH (48 pins, flat package) is mainly employed, with the block diagram given in Fig. 24. In addition, this IC has an automatic sequencer built in to perform track jumps, etc; based on the serial data transferred from the system microcomputer. The servo unit is described below on a component by component basis.

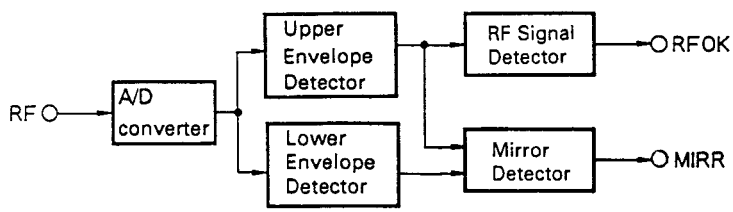



UPD6374AGH Block diagram Fig. 24

### (1) Mirror circuit

The mirror detector circuit is to determine an on-track or off-track status by detecting a mirror status, with an envelope amplitude extracted from an RF signal. For the reference to detect a lack of amplitude, the envelope amplitude is held at the peak with a sufficient large time constant and multiplied by two-thirds to obtain the reference value. Should an RF signal have no amplitude available (with the focus servo removed), the mirror detector circuit has an output (MIRR) go "H."




RF detector / mirror detector circuit block diagram

Mirror circuit Fig. 25

### (2) Focus OK circuit

The FOK circuit compares the upper envelope of an RF signal with the value set by the microcomputer and outputs a result of such comparison at the FOK terminal. ("H" is outputted, with [RF signal's upper envelope] > [set value].)

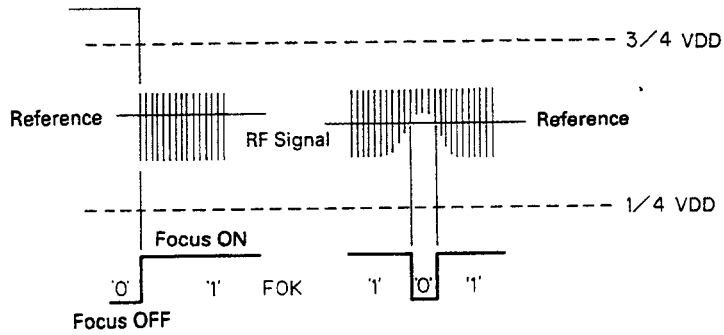
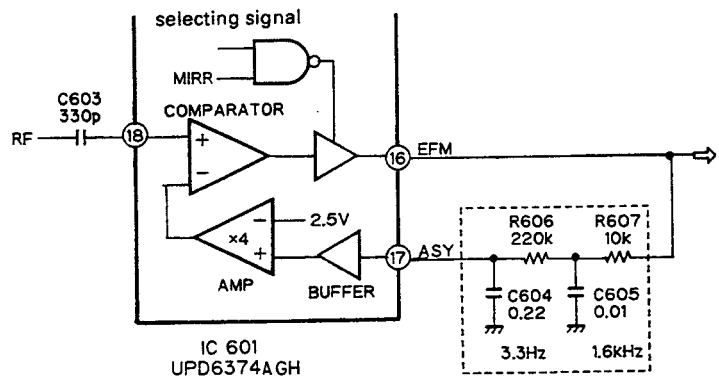



Fig. 26

### (3) EFM comparator

The EFM comparator is to digitize an RF signal. Since its error rate increases under the influence of an asymmetry generated, the EFM output signal is made to pass through a low-pass filter by making use of the fact that a bit is generated at a probability of 50 %. And the signal so filtrated is taken for a comparison level. The present system has a low-pass filter cut off fc = 3.3 (Hz) for C604 and R606 and fc = 1.6 (kHz) for C605 and R607.




EFM comparator

Fig. 27

### (4) Command code

A list of the commands used in the present system is given below.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10H | SK | TM | TEH | FR | TK | TB | T CNT | BRK |
| 11H | FON | TON | SON | MON | FST | DFCT | JSK | TAB |
| 12H | SLED NON-SENSITIVE AREA | | | | HSL | SCV | RFP | TFP |
| 13H | FOK LEVEL | | | | FSPV 1 | FSPV 0 | T1 | T0 |
| 14H | 00 (h) | | | | | | | |
| 15H | 0 | 0 | 0 | 0 | 0 | TCS | CV2 | E3EN |
| 16H | 0 | 0 | 0 | 0 | FPW | TPW | SPW | MPW |

| | | | | | |
|---|---|---|---|---|---|
| 20H | TRACK KICK LEVEL a | | | | |
| 21H | TRACK KICK LEVEL b | | | | |
| 22H | TRACK KICK TIME A | | | | |
| 23H | TRACK KICK TIME B / TRAVERSE COUNTER N (H) | | | | |
| 24H | TRAVERSE COUNTER N (L) | | | | |
| 25H | SLED KICK LEVEL | SL1 | SL0 | 0 | 0 |

**<Description of Functions>**

SK: sled kick control; the sled is kicked at a value set in 25 H, when SK is set to "1."

TM: tracking mute control
With TM = "1," the tracking output is put by TEH into either PRECEDING VALUE HOLD or REFERENCE HOLD (Data 00 value) mode.
With TM "0," a result of tracking and filtration is outputted (in the normal mode).

TEH: error hold control upon track jump
With SK = TM = "1," the tracking output has PRECEDING VALUE HOLD or REFERENCE HOLD mode selected.
REFERENCE HOLD, with TEH = "0" and PRECEDING VALUE HOLD, with TEH = "1"

FR: output level polarity control upon tracking and upon sled kicking
With FR = "0," a value available at output level registers (20,21 and 25 H) is multiplied by -1 and outputted.
With FR = "1," an output level register is outputted unchangedly.

TK: controlling both track jump trigger and traverse counter load; it has two meanings according to the T. CNT bit.
With T.CNT = "0," set the TK bit to "1" and the track jump sequencer will start.
With T.CNT = "1," set the TK bit to "1" and the traverse counter will be loaded with Values 23 H and 24 H.

BRK: half-wave brake circuit control
With BRC = "1," the half-wave brake is ON.

TB: selecting a tracking filter coefficient bank:
With TB = "0," the tracking filter bank goes 0.
With TB = "1," the tracking filter bank goes 1.
FON, TON, SON and MON: servo output (PWM output) on/off control
With any = "1," the PWM output is on.
With any = "0," the PWM output has stopped.
With PWM output stopped, a high impedance is outputted with the PWM in the single-phase 3-value output mode.

FST: focus search control
With FST = "1," a focus search will be started if FON = 1.

DFCT: tracking output hold control with flaw detected
With DFCT = "1," the tracking hold is outputted upon detection of flaw.

JSK: sled kick control upon jump
With JSK = "1," the sled is kicked at a level set in 25 H for a duration of the track jump.

TAB: track jump sequencer operation abort control
With TAB = "1," the track jump sequencer stops operating.
SLED NON-SENSITIVE AREA: A sled dead zone is controlled at an absolute vale of 4 bits.

HSL: selecting the tracking output hold control
With HSL = "0," the tracking output hold is controlled by a missing FOK signal.
With HSL = "1," the tracking output hold is controlled by means of an external hold.

SCV: selecting a sled servo control with CLV lock
With SCV = "0," the sled servo is turned off (with PWM output stopped) to unlock CLV.
With SCV = "1," the sled servo is normally on, irrespective of whether or not CLV is locked.

RFP: selecting the polarity of data to an RF processor system (circuits to generate FOK, MIRR, etc.)

TFP: selecting the polarity of a tracking error zero cross (TEC) signal

FOK LEVEL:
setting a reference value in the RF detector circuit

FSPW1, FSPW0:
selecting a PWM output carrier

FSPW0: changing a motor system PWM carrier 88.2 kHz with FSPW0 = "0" and 22.05 kHz with FSPW0 = "1."

FSPW1: changing an actuator system PWM carrier 88.2 kHz with FSPW1 = "0" and 176.4 kHz with FSPW1 = "1."

T1, T0: square wave cycle upon focus search

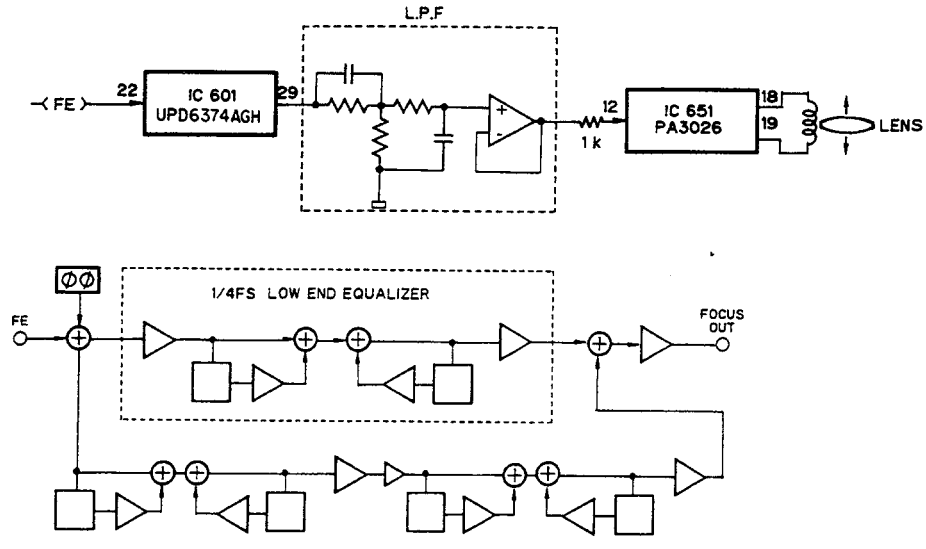
| SETTING | | CYCLE |
|---|---|---|
| T0 | T1 | |
| 0 | 0 | approx. 0.74 sec. ($2^{16}$/Fs) |
| 0 | 1 | approx. 1.49 sec. ($2^{17}$/Fs) |
| 1 | 0 | approx. 2.97 sec. ($2^{18}$/Fs) |
| 1 | 1 | approx. 5.94 sec. ($2^{19}$/Fs) |

20 H, 21 H:
register to set a kick level upon track jump
22 H, 23 H:
register to set a kick time upon track jump
Kick Time = (set value + 1) × 1/Fs (11.3 µs)
23H, 24H:
traverse counter setting register
25H: sled kick setting register
SLED KIK LEVEL:
sled kick level setting register
SL1, SL0:
selecting SLED FULL KICK or SHORT mode

| SL1 | SL0 | MODE |
|---|---|---|
| 0 | 1 | short |
| 1 | 0 | full kick |
| 0 | 0 | normal kick |

TCS: selecting the tracking zero cross comparator
TECO input, with TCS = "0" and
TEC1 input, with TCS = "1"
CV2: selecting the sensitivity of CLV error detector with speed doubled
Normal speed selected, with CV2 = "0" and
Double speed selected, with CV2 = "1"
E3EN: controlling the function of protecting EFM ≦ 3T upon high-speed access
protector off, with E3EN = "0" and Protector on, with E3EN = "1."

## (5) Focus servo system




FOCUS SIGNAL FLOW
(IC601)

Fig. 28

The digital loop filter is built in the interior of the IC. Sending a coefficient from the microcomputer will allow you to obtain a desired equalizer curve. The present system has an equalizer curve shown in Fig. 32.

a) In-focus
In the in-focus sequence, the lens is driven into a focus S-curve (approx. 10 µm) to close the servo loop on an in-focus basis. A flow of signals in focus is shown in Fig. 29.

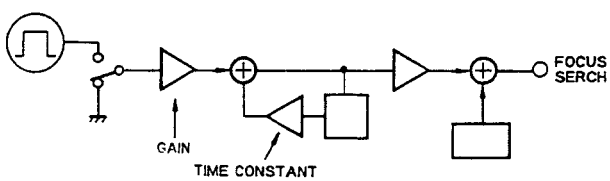



Fig. 29

The search voltage is designed to fall within a range of the lens drive distance ± 1.0 mm, being entirely dependent upon the sensitivity of a focus actuator. In the present system, both gain (voltage) and time constant are determined according to a coefficient from the microcomputer, based on the pulse in a specified cycle, which has been set in a register. The timing in which a focus is to be closed, moreover, is generated, based on the value which has been set as referred to in a signal flow shown in Fig. 30.

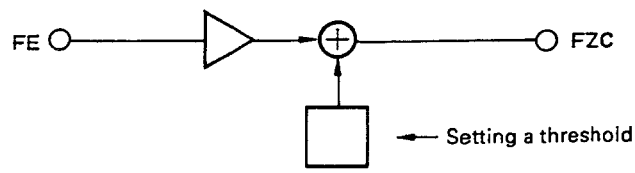



Fig. 30

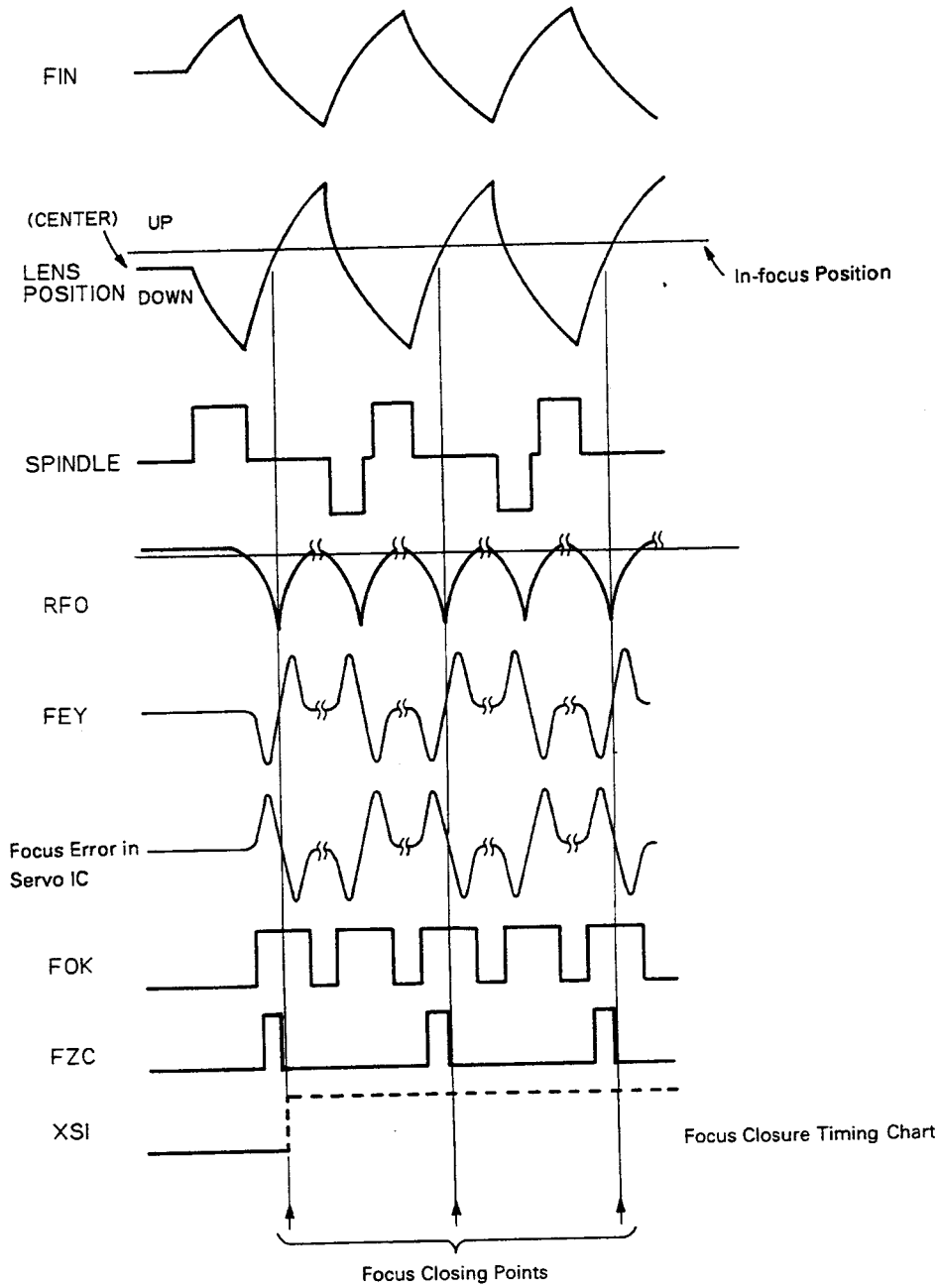
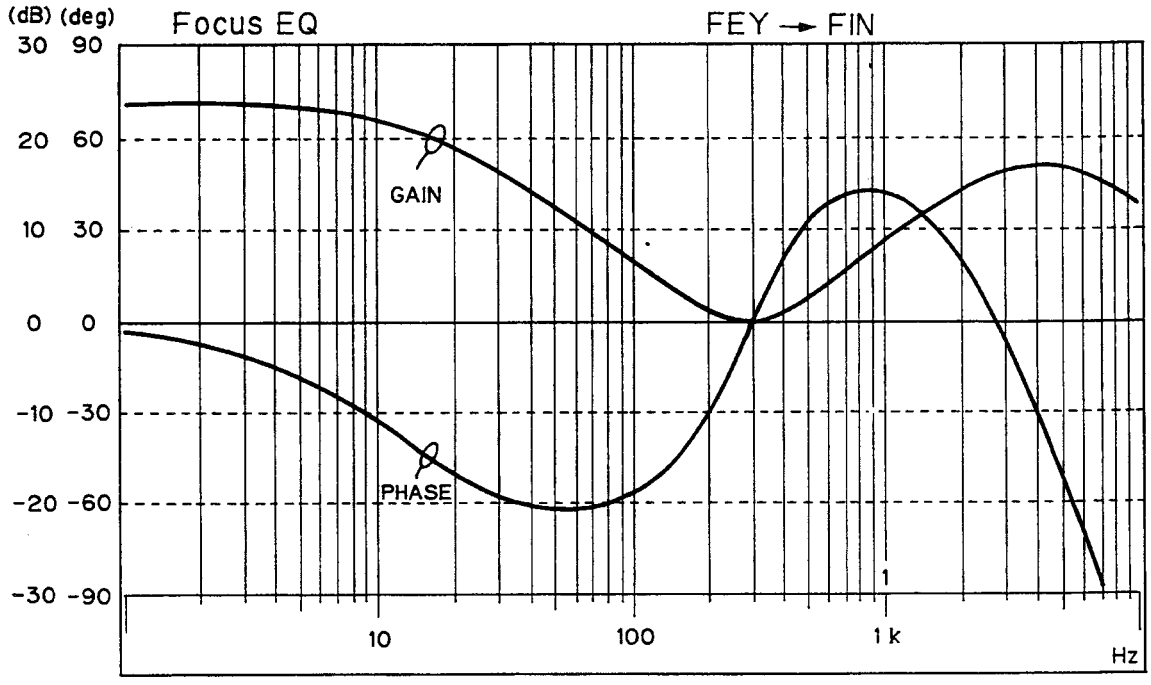

FIN
(CENTER)
UP
LENS POSITION
DOWN
In-focus Position
SPINDLE
RFO
FEY
Focus Error in Servo IC
FOK
FZC
XSI
Focus Closure Timing Chart
Focus Closing Points

Fig. 31

### (6) Focus equalizer

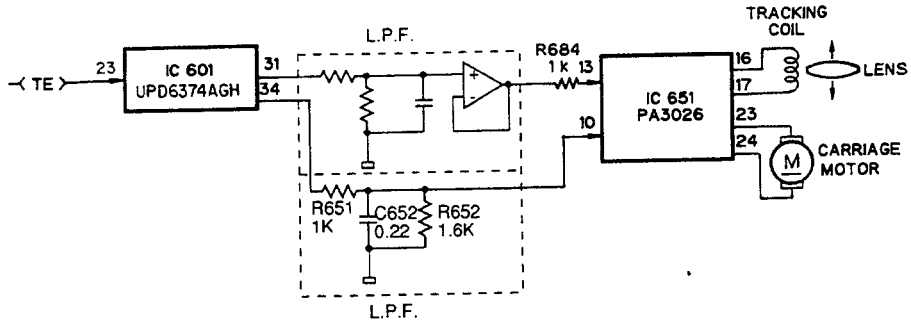
The present system permits a specific equalizer curve to be obtained according to the coefficient sent from the microcomputer. A digital filter built in IC UPD6374AGH and an active filter mounted in the exterior are used to obtain a specified equalizer curve.




Focus equalizer (Example)

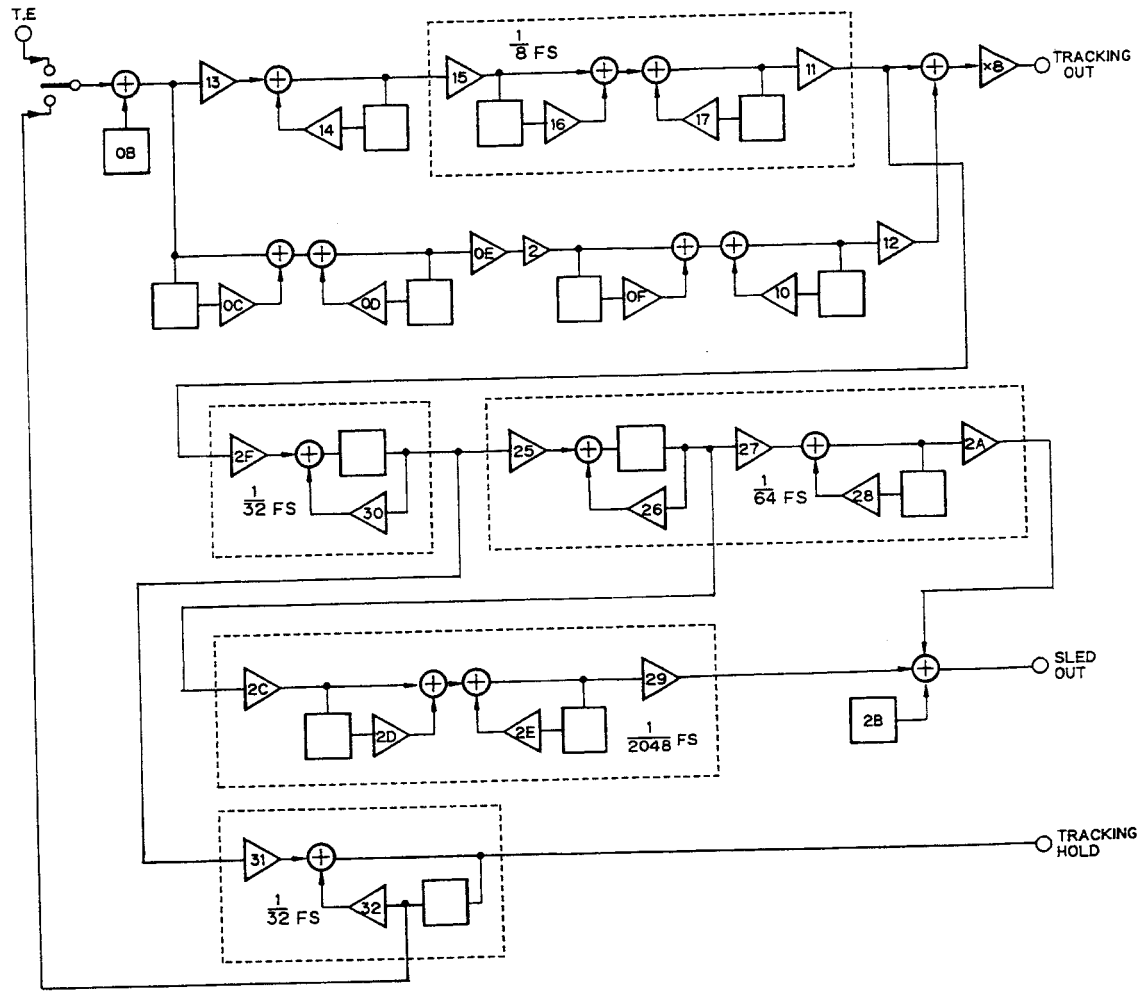
Fig. 32

## (7) Tracking carriage servo system




Tracking carriage servo block diagram

Fig. 33




Tracking carriage signal flow chart
(IC601)

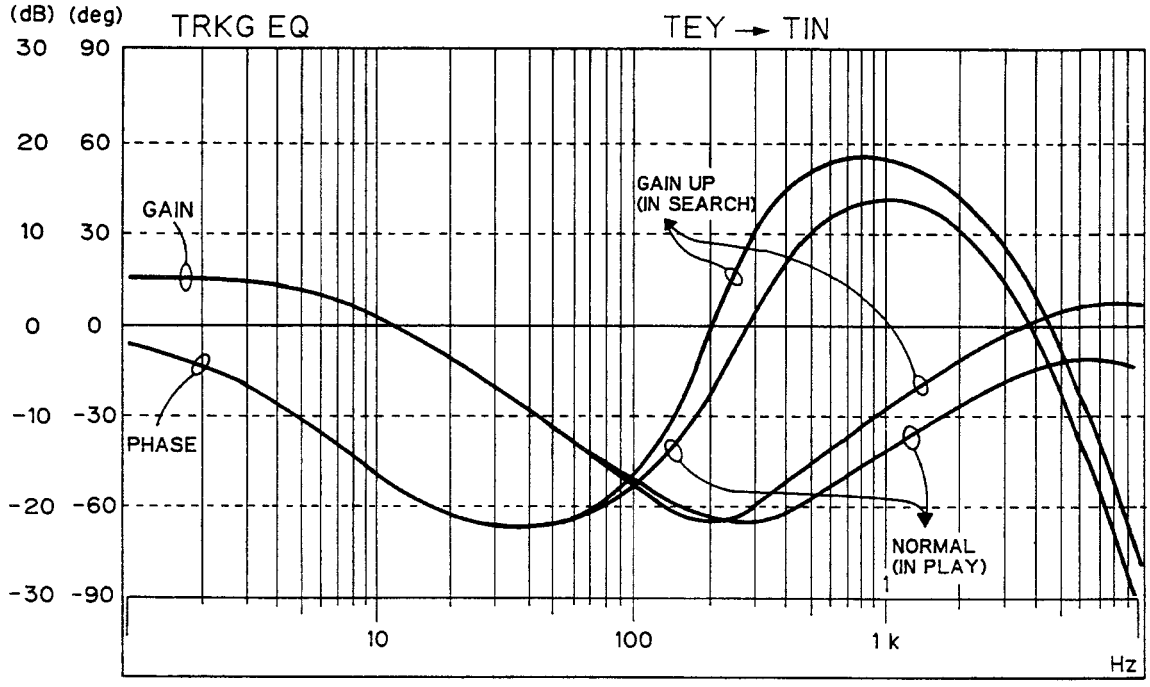
Fig. 34

Shown in Fig. 33, 34 are a block diagram of the tracking carriage servo system and a flow of signals in IC UPD6374AGH. To make a track jump either forward or reverse, tracking kick and brake voltages and carriage kick and brake voltages are set in related registers beforehand. A jump forward or reverse is made at the voltage which has been set in an instruction from the microcomputer.

a) Traking equalizer

In the present system, a digital filter is built in IC UPD6374AGH, allowing a specific equalizer curve to be obtained according to the coefficient sent from the microcomputer. And a passive filter is externally mounted. These two filters are used to obtain a specified equalizer curve. To allow a stable pull-in throughout the search, moreover, the equalizer curve applied is so set as to obtain a higher level of gain than that during the play.

Fig. 35 shows the tracking equalizer curves observed during both play and search.




Tracking equalizer (Example)

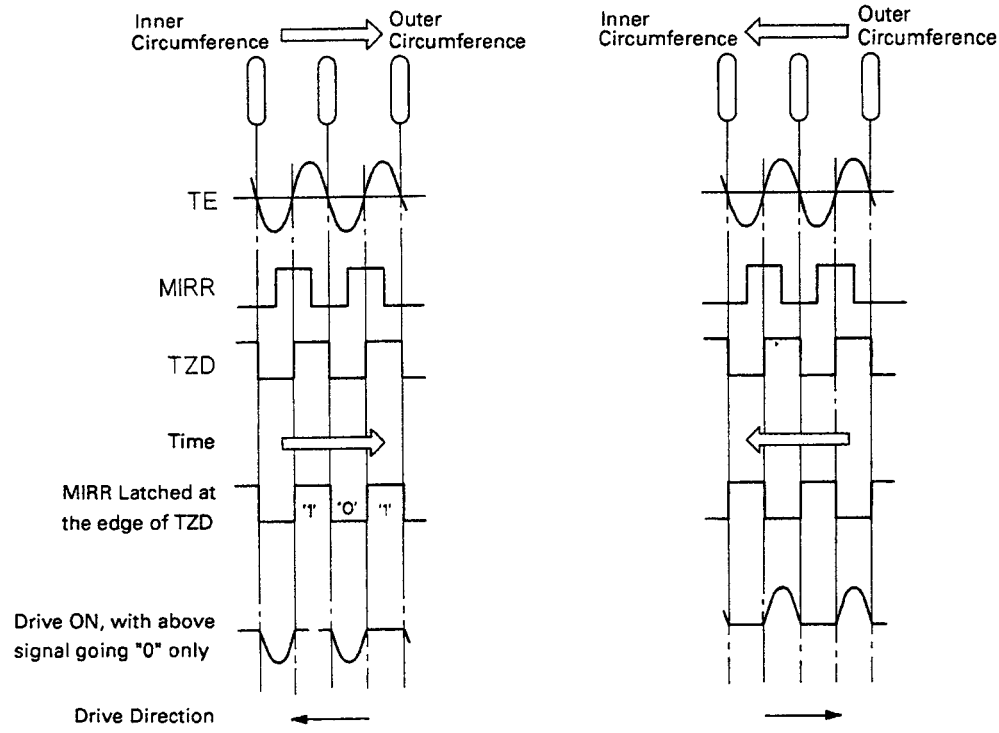
Fig. 35

b) Brake Circuit (Fig. 36)

Since the actuator is put into a non-linear status in the in-focus mode or in the track-jump mode, the pull in the servo loop turns out very poor after completion of a jump. While both pickup and disc are relatively moving, the brake circuit permits tracking to be closed smoothly. The direction in which both pickup and disc are moving is detected, based on a phase relation between MIRR and tracking error signals. With an accelerating component only cut off the tracking error, the decelerating component only is used while repeating the ON/OFF operations of servo on a chopper basis.

Thus, a stable pull in the servo loop is performed.

This circuit's ON/OFF operations are controlled by the microcomputer.

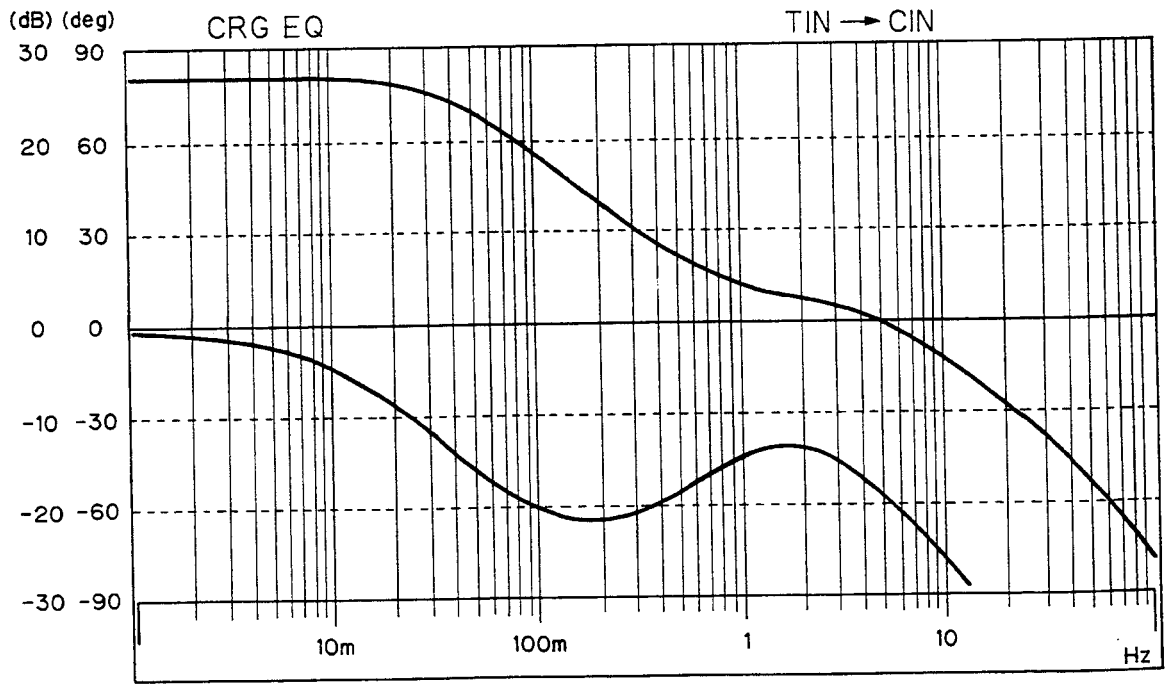



Brake circuit operation

Fig. 36

c) Carriage equalizer

As shown in the signal flow, the carriage servo system takes for an input the voltage at which the tracking actuator is driven. Based on the equalizer curves shown in Fig. 37, moreover, the system obtains those components which are required to feed the carriage. In the present system, a threshold voltage is set beforehand so as to turn on the carriage servo when the tracking actuator has a lens deflection fall outside the range of approximately ±30 tracks in relation to the low-pass filter output at the tracking drive voltage.

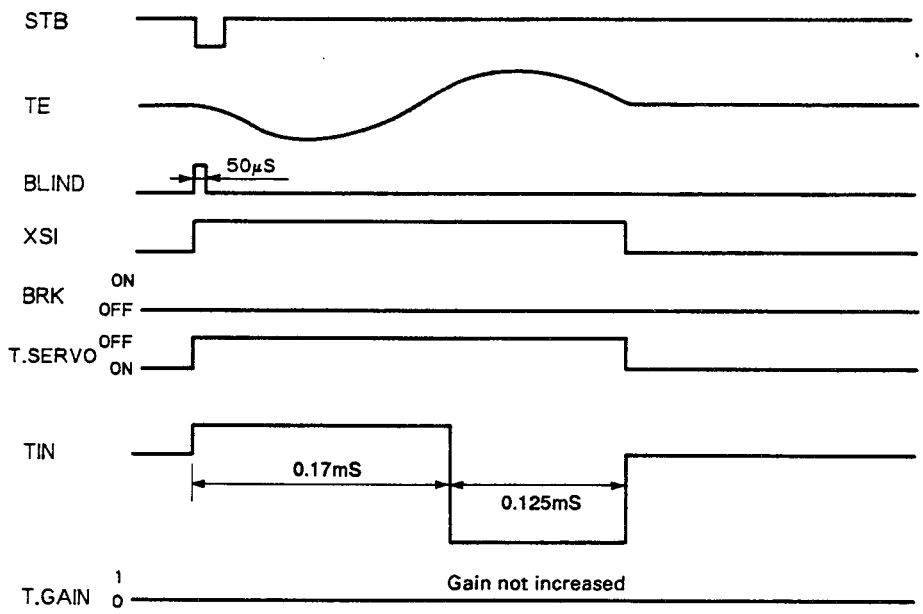



Carriage equalizer (Example)

Fig. 37

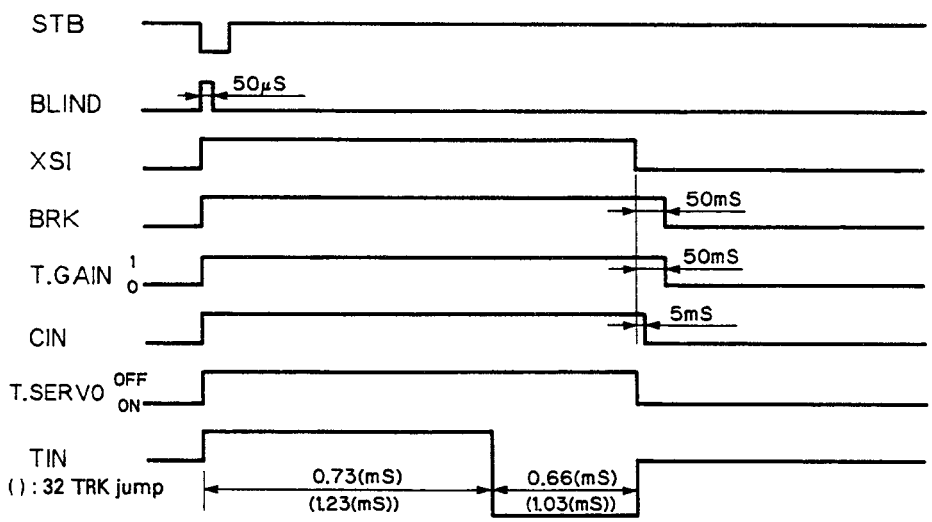
### (8) Track Jump

The present system is jumping tracks 1, 10 and 32 subject to an automatic sequence of the UPD6374AGH. The 64, 80 track jumps conventionally available have been substituted for 32TRK × 2 and 32TRK × 3, accordingly.Fig. 38, 39shows a timing chart of the 1, 10 and 32 track jumps.




Single jump

Fig. 38

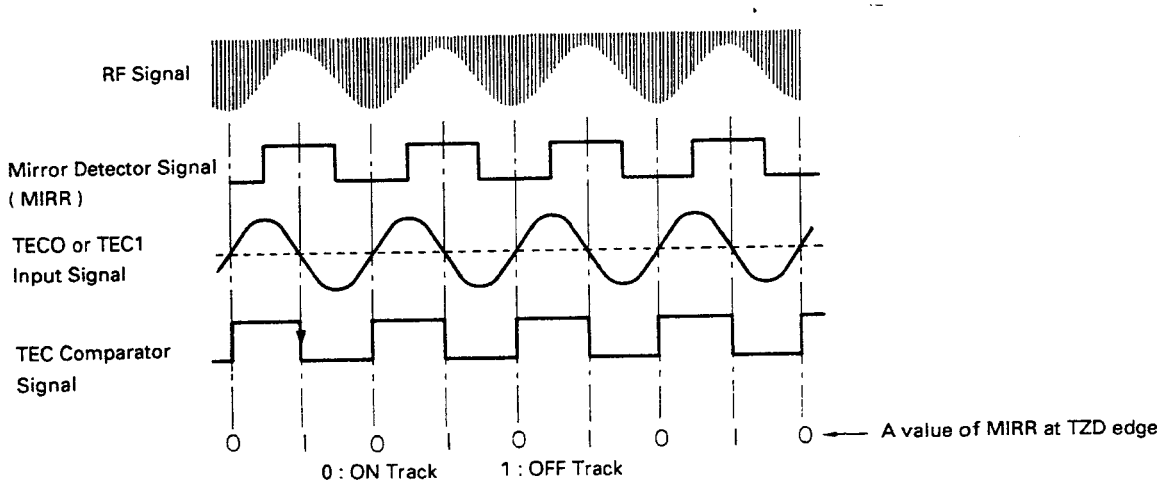



10/32 Track jump

Fig. 39

### a) Track jump counter

When tracks are consecutively crossed, a tracking error signal will not fail to cross the DC offset point in both on- and off-track modes as shown in **Fig. 40**. This point, threrfore, is used to determine either on- or off-track so as to count the number of cycles in which the on-track is switched over to the off-track. A count value is set by the microcomputer. And this count value is given priority to the kick-setting time.


RF Signal
Mirror Detector Signal
( MIRR )
TECO or TEC1
Input Signal
TEC Comparator
Signal
0 0 0 0 0
A value of MIRR at TZD edge
0 : ON Track
1 : OFF Track
The number or cycles in which 0 changes to 1 should be counted.

Track count jump

Fig. 40

## 3. CLV Control Stage

### (1) CLV control command and CLV mode command

MSB LSB

| D | I | L | G | T | D2 | D1 | D0 |
|---|---|---|---|---|---|---|---|

| | | | |
|---|---|---|---|
| D | 0 | RFCK/4 and WFCK/4 | Select a steady servo phase comparison signal. |
| | 1 | RFCK/8 and WFCK/8 | |
| I | 0 | RFCK/16 | Select a bottom hold cycle of pull-in and rough servos. |
| | 1 | RFCK/32 | |
| L | 0 | MDF, MDR (H, Z) outputs | Select an MDF/MDR output terminal selecting method. |
| | 1 | MDF, MDR (H, L) outputs | |
| G | 0 | −12 dB | Select the gain of pull-in and rough servos. |
| | 1 | 0 dB | |
| T | 0 | RFCK/2 | Select a peak hold cycle of pull-in servo. |
| | 1 | RFCK/4 | |

| D2 | D1 | D0 | MDF | MDR | Control Status |
|---|---|---|---|---|---|
| 0 | 0 | 0 | L | L | stop |
| 0 | 0 | 1 | H | L | kick |
| 0 | 1 | 0 | L | H | brake |
| 0 | 1 | 1 | L | L | stop |
| 1 | 0 | 0 | L/H | L/H | pull-in servo |
| 1 | 0 | 1 | L/H | L/H | rough servo |
| 1 | 1 | 0 | L/H | L/H | steady servo |
| 1 | 1 | 1 | L/H | L/H | applied servo |

**• Pull-in Servo**

This servo is used to pull the spindle motor speed into a specified number of revolutions. With a cycle of 8.6436 MHz reckoned as T, we can get "22T" (synchronous signal) as the maximum inversion interval of an EFM signal at the specified number of revolutions. Therefore, determine the EFM signal's maximum inversion interval and compare it with "22T" so that we can detect whether the motor speed is higher or lower than the specified number of revolution.

| EFM SIGNAL MAX. INVERSION INTERVAL | MDF TERMINAL | MDR TERMINAL | MOTOR SPEED |
|---|---|---|---|
| "21T" and below | L(Z) | H | high |
| "22T" | L(Z) | L(Z) | |
| "23T" and above | H | L(Z) | low |

Z: High impidamce

• Rough Servo

This servo is used for the high-speed access in which the carriage is moved at a high speed, with focus servo ON and tracking servo OFF.

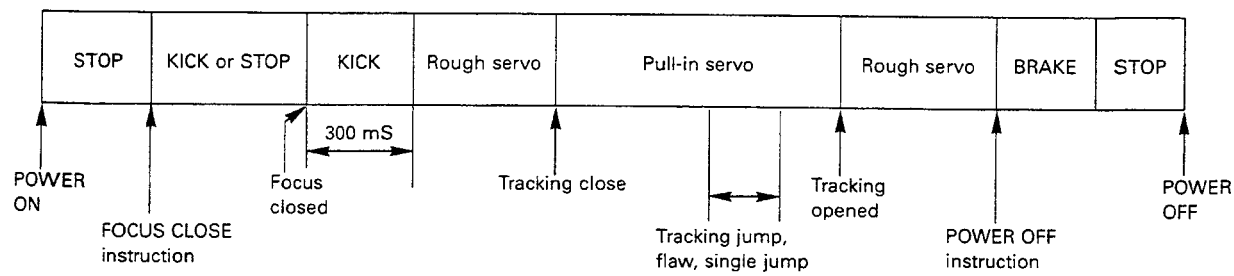
• Steady Servo

This servo is used to maintain the spindle motor speed at a specified number of revolutions.
It is outputted as a result of comparing the phase between WFCK/4 and RFCK/4 or between WFCK/8 and RFCK/8.

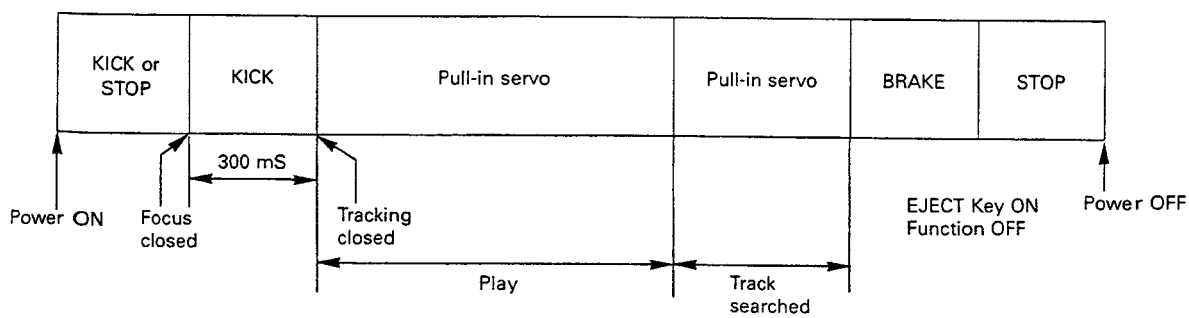
• Application Servo

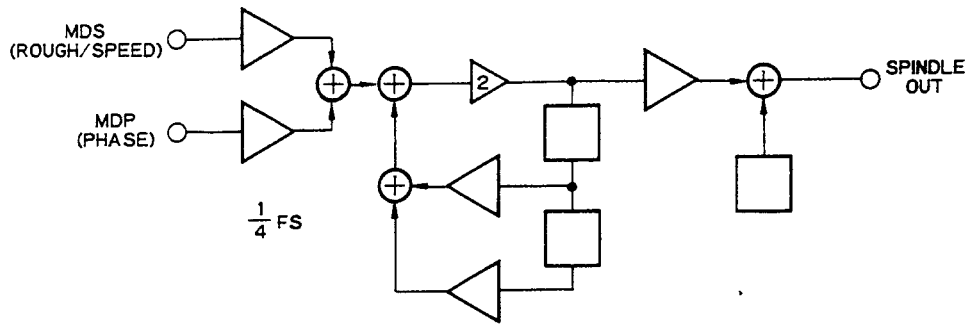
This is the CLV servo mode available during the normal operation. In the EFM demodulator block, every WFCK/16 is sampled to determine whether or not the frame synchronizing signal coincides with an output of the internal frame counter. As a result, a signal is generated to show whether or not they are coincident. Once this signal has been found not incident in eight consecutive cycles, the status is first determined asynchronous. Under any other conditions, the status is deemed synchronous. The CLV application servo mode automatically selects the pull-in servo in the asynchronous status and the steady servo in the synchronous status. This feature is not employed in the present system.

**• Test Mode**




**• Normal Mode**



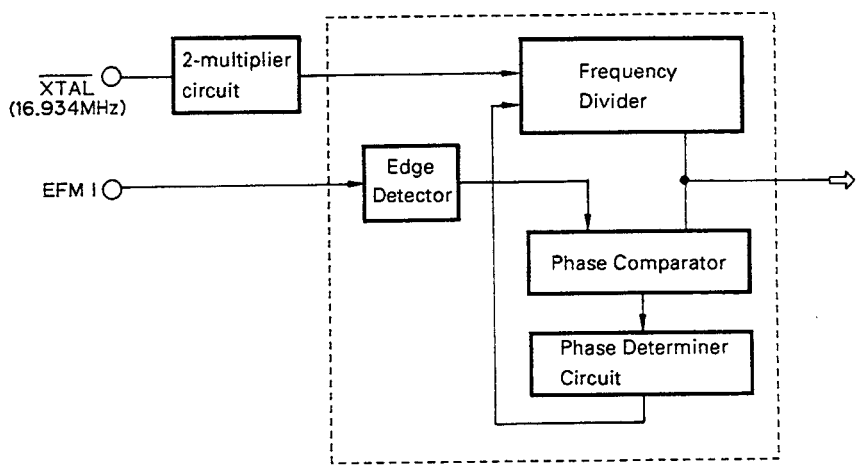



Spindle signal flow chart
(IC601)

Fig. 41

**(2) PLL stage**

The present system employs a digital PLL circuit illustrated below. This PLL circuit operates so as to lock the rising edge of a PLCK and the edge of an EFM signal. And it has a resolution of as high as approximately eight times IT (T = EFM signal's bit rate = 1/4.3218 MHz). Both frequency divider output frequency and EFM bit rate have their errors automatically regulated to adjust the mean free-run frequency to the bit rate.




Digital PLL block diagram
(IC701)

Fig. 42

## 4. Power Supply Stage

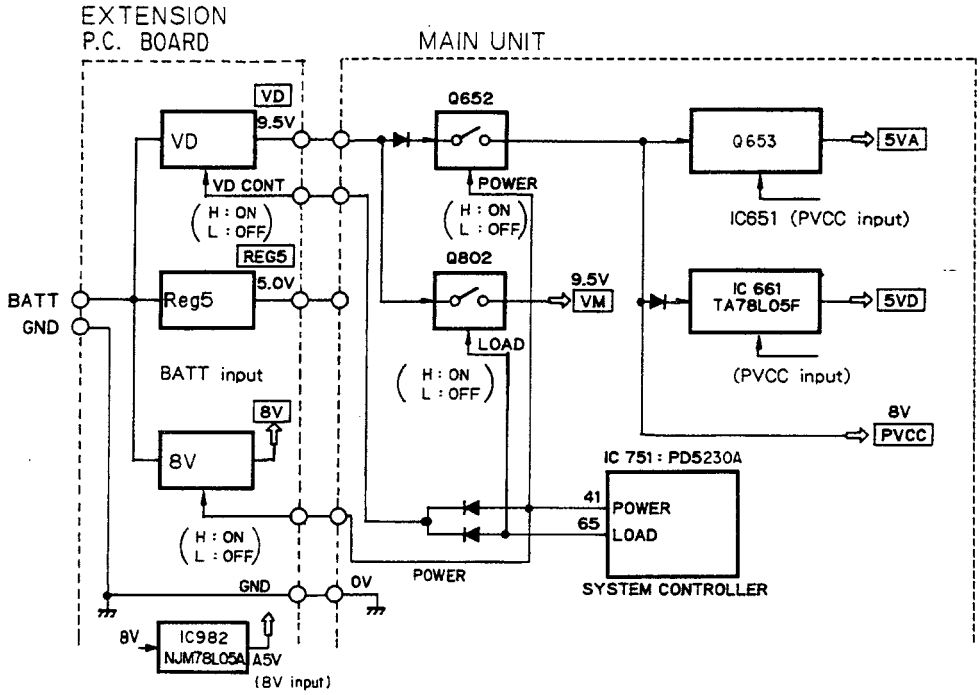



Fig. 43

The −5V power in the main unit is available in two types; 5VA and 5VD. The 5VA is used to supply power to the pickup LD and to the preamplifier system and the 5VD to other LSIs.
The VM is used to supply power to the mechanism-driver IC (IC801). No output is available as long as mechanisms are operating.

The REG5 is used to supply power to the system controller (IC751 and 755) while outputting normally.
The 8V is used for the auto system circuit (amplifier and isolator) in the extended unit and not supplied to the main unit. From this 8V, IC982 generates the power supply (A5V) to the D/A converter in the extension unit.
It should be noted that the Q973 in the VD circuit has a very high temperature.

### 5. New Test Mode (FH-M70+CDX-M6)

The new test mode performs more or less the same operations as the normal mode PLAY, but is able to carry out a more detailed analysis of error stop causes. During setup, it displays the operation status of the CD control software. After setup, it displays the causes, time of occurrence, and disc number of protection operations, errors, and time-out of FOK, LOCK, sub-code readability and un-readability, sound dropping, mechanism error, etc.
The following new test mode keys are examples when combined with FH-M70.

### • New Test Mode (aging operation and setup analysis)

The CD, either single or multiple, plays in the normal mode. After being set up, it will display FOK (focus), LOCK (spindle), subcode, sound skip, protection against a mechanical error or the like, occurrence of an error, cause and time of an expiry, if any, (and disc number in the multi-mode).
During the setup, the CD software operation status (internal RAM and C-point) is displayed.
Since it is nesessary to cope with the error number display function.

(1) How to Put in the NEW TEST Mode
See the test mode flow chart Page 8.

(2) Relations of keys between TEST and NEW TEST Modes.

| P-BUS Commands | Keys | Test Mode<br>Regulator OFF | Regulator ON | New Test Mode<br>Play in progress | New Test Mode<br>Error / Protection } Talking place |
|---|---|---|---|---|---|
| B0 | BAND/REL | Regulator ON | Regulator OFF | BAND/REL | Time of occurrence / Cause of error } Selected |
| B1 | ►►I | — | FWD-KICK | ►►I | — |
| B2 | I◄◄ | — | REV-KICK | I◄◄ | — |
| B3 | F · 1 | — | TRACKING CLOSE | F · 1 | — |
| B4 | F · 4 | — | TRACKING OPEN | F · 4 | — |
| B5 | F · 2 | — | FOCUS CLOSE | F · 2 | — |
| B6 | — | — | FOCUS OPEN | — | — |
| B7 | — | — | Jump-OFF | — | — |
| B8 | F · 3 | To new Test Mode | Jump-Mode selected | F · 3 | Occurrence TNo / Time of occurrence } Selected |

Operations, such as EJECT, CD ON/OFF, etc. are to be performed normally

(3) Error Cause (Error Number) Code

| Error Code | Classification | Mode | Description | Cause/Detail |
|---|---|---|---|---|
| 40 | ELECTRIC | PLAY | FOK = L 100 ms | Put out of focus |
| 41 | ↑ | ↑ | LOCK = L 150 ms | Spindle unlocked |
| 42 | ↑ | ↑ | Subcode unacceptable 500 ms | Subcode failes to read |
| 43 | ↑ | ↑ | Sound skipped | Last address memory operated |

Scar, Stain, Vibration, Servo defect, etc...

*With CD single, no mechanical error is displayed while aging. The error code is identical with those in the normal mode.

(4) Indicating an Operation Status During Setup

| Status No. | Description | Protection operation |
|---|---|---|
| 01 | Carriage home mode started | None |
| 02 | Carriage moving on the internal circumference | 10-second time out |
| 03 | Carriage moving on the external circumference | 10-second time out |
| 11 | Setup started | None |
| 12 | Spindle turn/Focus search started | None |
| 13 | Waiting for focus closing | Failure to focus closing |
| 14 | Spindle kicked and focus checked | Out of focus |
| 15 | Tracking closed and focus checked | Out of focus |
| 17 | Carriage closed and focus checked | Out of focus |
| 18 | Lock, subcode } Waiting | Failure to lock, Subcode failed to read out of focus |
| 19 | End | None |

(5) Example of 7-segment Display

(a) SET UP in progress

| TRACK | MIN | SEC |
|---|---|---|
| 11 | 11 | 11 |

| TRACK |
|---|
| 11 |

| MIN | SEC |
|---|---|
| 11 | 11 |

While in the TEST MODE, a status number is indicated in TNO, MIN and SEC.

(b) Operation (PLAY, SEARCH, etc.) in progress Perfectly identical with that in the multi mode.

(c) Protection/Error upon occurrence

ERROR-XX
Err-XX, ERR-XX
E-XX

While in the error mode, an error number is displayed in MIN and SEC.

Select the display with the BAND/REL key.

| TRACK | MIN | SEC |
|---|---|---|
| 10 | 40 | 05 |

| TRACK |
|---|
| 10 |

| MIN | SEC |
|---|---|
| 40 | 05 |

Select the display with the F · 3 key.

While in the PLAY MODE, an adsolute time is indicated in TNO, MIN and SEC.

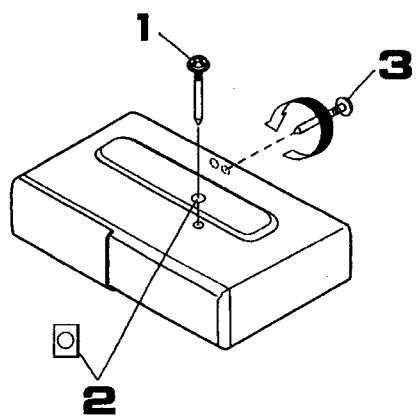



Fig. 44

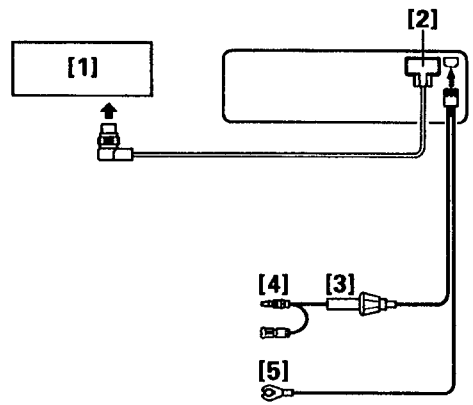



Fig. 46

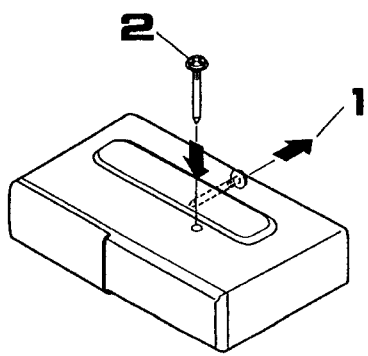
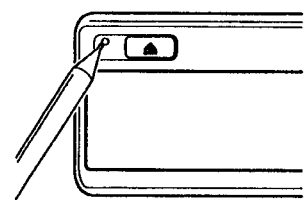



Fig. 45



## Pressing the clear button

If the power does not switch on or if the compact disc player does not operate when the button on the multi-CD controller is pressed, or if the multi-CD controller display is incorrect, press this button on the player with the tip of a pencil to restore normal operation. (This button is located inside the door.) **Always press the clear button on the multi-CD controller, too, after pressing this button.**

## Transportation pin

### Removing the transportation pin (Fig. 44)

A transportation pin is installed to protect the player during transportation. Before mounting the player, remove the transportation pin and cover the hole with the supplied adhesive seal. Screw the removed transportation pin into the specified hole; it will be needed if you retransport the player.

1. Peel off adhesive tape and remove the pin.
2. Cover the hole with the seal provided.
3. Screw the pin into the left-side hole of the 2 holes.

### Reinstalling the pin (Fig. 45)

To transport the player, reinstall the transportation pin as follows:

**Before removing the player**

Play back the first track of a disc, and stop within 10 seconds. Remove the magazine, wait about 10 seconds, then remove the player.

1. Remove the pin.
2. Insert the pin in its original position, and fix it with Scotch tape.

## Connecting the Units

- Before mounting, remove the transportation pin and connect the units temporarily. Check that the units are connected correctly by operating the multi-CD controller.
- After connection is complete, press the clear buttons on the player and the multi-CD controller with the tip of a pencil.
- *Be sure to connect the ground lead (black) to the vehicle body or some other metal part that is properly grounded to the chassis. If the ground lead is not properly connected, noise may occur or the player or multi-CD controller may not operate correctly.*
- *This unit is for vehicles with a 12-volt battery and negative grounding. Before installing it in a recreational vehicle, truck, or bus, check the battery voltage.*
- *To avoid shorts in the electrical system, be sure to disconnect the battery ⊖ cable before beginning installation.*
- *Check whether installation and wiring have been completed correctly. Replace the removed car components, then connect the end of the cable to the negative ⊖ terminal of the battery.*
- *Secure the wiring with cable clamps or adhesive tape. To protect the wiring, wrap adhesive tape around them where they lie against metal parts.*
- *Route and secure all wiring so it cannot touch any moving parts, such as the gear shift, handbrake, and seat rails. Do not route wiring in places that get hot, such as near the heater outlet. If the insulation of the wiring melts or gets torn, there is a danger of the wiring short-circuiting to the vehicle body.*
- *Don't pass the orange lead through a hole into the engine compartment to connect to the battery. This will damage the lead insulation and cause a very dangerous short.*
- *Do not shorten any leads. If you do, the protection circuit may fail to work when it should.*
- *Never feed power to other equipment by cutting the insulation of the power supply lead of the unit and tapping into the lead. The current capacity of the lead will be exceeded, causing over heating.*
- *Replace fuses only with the types stipulated on the fuse holder.*

**(Fig. 46)**

[1] Multi-CD controller
[2] Insert the 13-pin connector cord plug into the socket of the set.
[3] Fuse holder
[4] Orange
To terminal always supplied with power regardless of ignition switch position.
[5] Black (ground)
To vehicle (metal) body.

# Using the Compact Disc Magazine

### Precautions when handling magazines

- *Do not put the magazine in a place where it will be exposed to high temperatures or direct sunlight.*
- *Do not disassemble the magazine.*
- *Take care not to drop the magazine or knock it against anything.*
- *Do not use cracked or warped trays.*
- *Never insert anything other than discs. Do not attach a label or tape to a disc.*
- *The use of benzine, thinner, insecticide, or other volatile chemicals may damage the magazine surface.*

### Extra magazines

If you need more magazines, please ask your nearest dealer for magazine JD-T612.

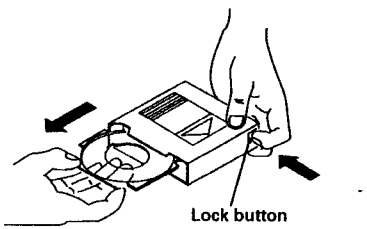
### Notes on 8-cm (3-inch) CDs

- *Do not use an 8-cm CD adapter. If it is used, the player may fail. To load an 8-cm CD, you need a special 8-cm CD tray (Part No. CXA5485).*

### Inserting discs

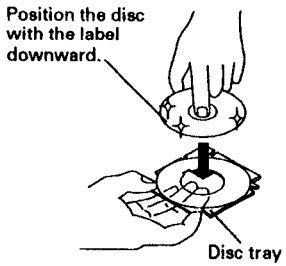
Load the discs in the magazine supplied. Up to 6 discs can be loaded in the magazine. The discs are numbered 1 to 6 from the bottom disc tray.

1. Hold down the magazine lock button and, pull the tray out.



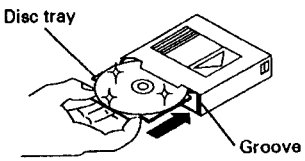

- *Pull the tray out by holding it from underneath as shown in the figure. The tray is detached from the magazine. Do not drop the tray or disc and so damage it.*

2. Put 1 disc on the disc tray, label downward.




- If the disc is loaded upside down, it will not play. The label side must face downward.
- Do not touch the recorded side of a disc when inserting or removing it.

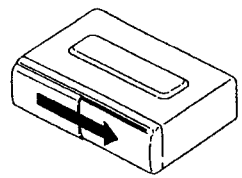
3.Insert the tray horizontally along the right and left grooves of the magazine until it clicks. (The disc must not lift from the tray.)



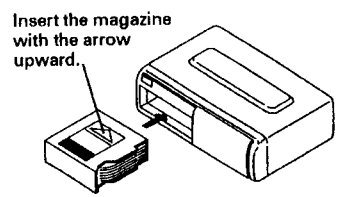

- *If the tray is not aligned with the right and left grooves, it cannot be pushed to the end. Do not bend or force the tray.*
- *Always load 6 trays in a magazine to prevent loss or warping of trays.*
- This compact disc player recognizes which magazine is in use from the bottom disc. Always keep a disc in the bottom disc tray.
- If you load a disc with the label generally printed in black facing up, not only will the player not be able to recognize whether the disc is set or not, but also, if you have a multi-CD controller, the controller will not display an error message to let you know about it. So make sure all the discs in each magazine have their label sides facing down.

## Loading and removing the magazine

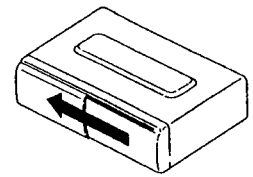
1.Slide and open the door.
Open it fully until it locks with a click.



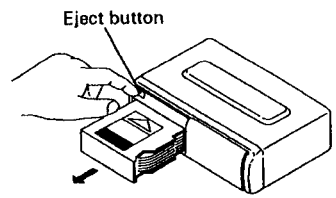
2.Insert the magazine.
- Make sure that the magazine is loaded with discs before inserting it into the player.
- Be careful to insert the magazine into player with the mark facing upward.
- *If the label on the magazine is coming off or wrinkled up, it may damage the eject mechanism, and in some cases, the magazine may not be ejected. Therefore, remove a damaged label completely before use.*




3.Slide and close the door.
- *Never leave the door open while playing discs. The entry of dirt, dust, or any other foreign matter into the player may cause it to fail.*



4.To remove the magazine, open the door and press the eject button. If the door is not fully open, the magazine will not be ejected.



# How to use the multi-CD player

How to use the multi-CD player is explained in the instruction manual supplied with the multi-CD controller. The operation method of this player is not described in the owner's manual for some models, or it may be different from the description. See the following items.

### Note on last position memory

The owner's manuals for the CD-M1 and KEX-M700 controllers say that the last track memory restarts play from the beginning of the track being played when the disc was stopped. But when you use one of these controllers with this player, the last position memory restarts play around the position at which the disc was stopped.
The owner's manuals for the KEX-M700B and KEX-M700SDK controllers say that the last track memory restarts play from the beginning of the track being played when the disc was stopped. But when you use one of these controllers with this player, the last position memory restarts play around the position at which the disc was stopped.

### Note on random play

When using the random play feature of this player, you can get random play using up to 6 discs in the magazine. The owner's manuals for the CD-M1 and KEX-M700 controllers say that random play works with only one disc. But when you use one of these controllers with this player, all 6 discs are available.
When using the random play feature of this player, you can get random play using up to 6 discs in the magazine. The owner's manuals for the KEX-M700B and KEX-M700SDK controllers say that random play works with only one disc. But when you use one of these controllers with this player, all 6 discs are available.

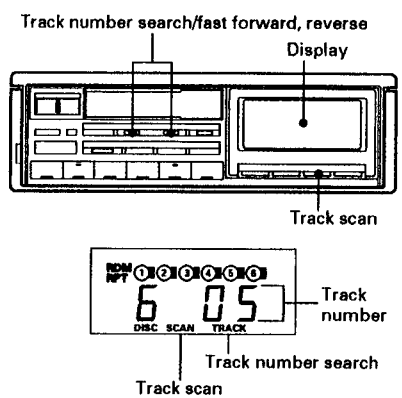
### Highlight scan

| | |
|---|---|
| KEH-M7000QR | KEX-M800 |
| KEX-M700 | |

If this player is combined with one of the models of mentioned above car stereo, it will offer highlight scan instead of track scan. In this case, ignore the section on track scan in the owner's manuals for the player, and read the following information on highlight scan instead. (This information refers to the KEH-M7000QR player, but applied to other players, too.)

| | |
|---|---|
| KEH-M7000SDK | KEH-M7001B |
| KEH-M7000B | KEH-M5000SDK |
| KEH-M5001B | KEH-M5000B |
| KEX-M800SDK | KEX-M801 |
| KEX-M800 | KEX-M700SDK |
| KEX-M700B | |

If this player is combined with one of the models of mentioned above car stereo, it will offer highlight scan instead of track scan. In this case, ignore the section on track scan in the owner's manuals for the player, and read the following information on highlight scan instead. (This information refers to the KEH-M7000B player, but applied to other players, too.)




### Using highlight scan

The highlight scan function plays one track after another for about 10 seconds each, beginning at a particular start time. Use it when searching for a piece you like. If you don't set the start time yourself, 10-second playback of each track starts one minute into each track.

1. Press the track scan button. (SCAN appears on the display).
2. Tracks will be played one after another for about 10 seconds, starting one minute into each track.
3. When you hear a track you like, press the track scan button again; the player will cancel highlight scan and continue playing the track.

- When highlight scan arrives back at the track at which it began, it is automatically cancelled and normal play resumes.

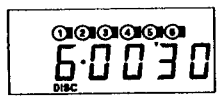
### Changing the start time

Example: Setting the start time to 30 seconds into each track

1. Press the + and – sides of the track number search button at the same time. (This causes TRACK to disappear and the start time to appear on the display.)

- On the KEX-M700 model, press the track scan/fast forward and reverse button (manual) to ready the player for fast forward and reverse.
- On the KEX-M700SDK and KEX-M700B models, press the track scan/fast forward and reverse button (manual) to ready the player for fast forward and reverse.

2. Using the + and – sides of the track number search button, set the time to 30 seconds.




3. Hold the track scan button down for more than 2 seconds. (SCAN appears on the display.) The next and subsequent tracks will be played with highlight scan, starting 30 seconds into each track.

- The start time can be set in 10-second steps. A time less than 10 seconds is taken as zero.
- If the total time of a track is less than the start time, the track is played from the beginning for about 10 seconds.
- If a track lasts for less than 10 seconds after highlight scan starts, the track is just played to the end, resulting in a shorter playing time.
- It is impossible to set a start time greater than the playing time for a particular track. If you want to start a long way into each track, make sure that you use a disc with long track.

## Products with which the player cannot be used

This player does not work with the following products:

| | |
|---|---|
| DEX-M300 | DPX-M200WC |

This player does not work with the following products:

| | |
|---|---|
| DEX-M300 | DEX-M300SDK |

## Error Mode

If an error occurs—for example, if the CD player will not work or if it stops while playing—"ERROR" followed by an error number appears on the CD controller display. The error number indicates the cause of the error; check the items listed below.

- Some multi-CD controllers display only "ERROR", without the error number; in this case, check items 11, 14, 30 and 80 below.

### Multi-CD controller display example

**E-11** **Err-11** **ERR-11** **ERROR-11**

| Error No. | Cause | Treatment |
|---|---|---|
| 11, 12 | Dirt or a scratch on the disc stops the laser beam from being able to focus. | Wipe off the dirt. Exchange the disc if it has been scratched. |
| | The disc has been inserted upside down. | Confirm that the disc has been inserted right side up. |
| 14 | The disc has been inserted upside down. | Confirm that the disc has been inserted right side up. |
| | An unrecorded compact disc (CD-R), which can be recorded on once is being used. | When you use a CD-R, load one that has been recorded on. |
| 30 | Dirt or a scratch on the disc hinders the track number search function. | Wipe the dirt off the disc. Exchange the disc if it is scratched. |
| 80 | There is no disc in the magazine. | Load a disc into the magazine. |
| A0, 10, 12, 50, 60, 70 | Electrical or mechanical system fault. | See Note (*). |

* Turn the car ignition switch off and on again, or press the source switch on the multi-CD controller to set CD playback again.